GOVERNMENT OF THE
GOLD COAST.

MEDICAL AND SANITARY REPORT

FOR THE YEAR

1917.

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GOLD COAST.

ANNUAL REPORT FOR THE YEAR ENDING DECEMBER 31ST, 1917.

I.—ADMINISTRATIVE.

1. MEDICAL STAFF ON 31st DECEMBER, 1917.

1 Principal Medical Officer.
1 Deputy Principal Medical Officer.
1 Senior Sanitary Officer.
2 Provincial Medical Officers.
6 Senior Medical Officers.
3 Junior Sanitary Officers.
1 Pathologist.
41 Medical Officers, 5 of whom are Medical Officers of Health.
13 Vacancies
  1 Sleeping Sickness Medical Officer.
  9 Medical Officers.
  2 Native Medical Officers.
  1 Medical Officer of Health.
1 Inspector Chemist.
1 Laboratory Assistant (vacant.)
5 Superintending Sanitary Inspectors.

EUROPEAN NURSING STAFF.

1 Senior Nursing Sister.
1 Senior Nursing Sister (vacant.)
6 Nursing Sisters.
1 Senior Nursing Sister seconded to Lome.

PRINCIPAL MEMBERS OF SUBORDINATE STAFF.

1 Chief Clerk.
1 First Class Clerk.
4 Second Class Clerks.
8 Third Class Clerks.
3 Temporary Clerks.
1 Messenger.

DISPENSING STAFF.

1 Chief Dispenser.
4 First Class Dispensers.
12 Second Class Dispensers.
11 Third Class Dispensers.

NATIVE NURSES.

6 Second Class Nurses.
24 Third Class Nurses.
25 Nurses.

LUNATIC ASYLUM.

1 Chief Attendant.
1 Assistant Attendant.
10 Attendants.
1 Matron.
1 Gatekeeper.

PRINCIPAL MEMBERS OF SUBORDINATE STAFF OF THE SANITATION BRANCH.

1 First Class Clerk.
2 Second Class Clerks.
3 Third Class Clerks.
1 Messenger.
3 First Class Sanitary Inspectors.
11 Second Class Sanitary Inspectors.
35 Third Class Sanitary Inspectors.
2 Female Sanitary Inspectors.
1 Disinfector Mechanic.
1 Storekeeper.
8 Attendants for Contagious Diseases Hospitals.
5 Vaccinators.
2 Third Class Clerks to Deputy Registrars of Deaths.
2 Clerks to Deputy Registrars of Deaths.
18 Sextons.
2 Messengers.

2. FINANCIAL.

(*a*) STATEMENT OF REVENUE FOR THE YEAR 1917.

Total Revenue	£1,918 10 10

(*b*) STATEMENT OF EXPENDITURE FOR THE YEAR 1917.

Medical Department (including Sanitary Branch)—	
Personal Emoluments	£52,627 18 10
Other Charges	62,797 3 1
Total	£115,425 1 11

II.—PUBLIC HEALTH.

(*a*) GENERAL REMARKS.

3. The following table shews the most noteworthy contrasts in the returns of diseases treated during the years 1915, 1916 and 1917 :—

	1915.	1916.	1917.
Small-pox ...	12	4	25
Chicken-pox ...	158	306	341
Dysentery { Amœbic ...	78	9	9
Type undiagnosed ...	544	527	510
Enteric Fever ...	17	6	10
Influenza ...	3	27	280
Malaria—Tertian ...	986	837	508
Quartan ...	46	28	25
Aestivo-autumnal ...	227	595	1,686
Chronic ...	159	80	168
Blackwater ...	9	16	24
Fever unclassified ...	1,324	2,052	1,096
Measles ...	7	91	82
Pneumonia ...	212	351	236
Rheumatic Fever...	37	51	17
Sleeping Sickness...	17	8	13
Whooping Cough...	77	161	262
Alcoholism ...	13	36	17
Yellow Fever ...	1	6	5
Tuberculosis ...	276	283	261
Plague ...	—	—	6

4. The *Dysentery* returns shew a slight decrease, and it is obvious from the number of cases in which the type is undetermined—510 out of 519 cases —that usually, owing to the shortage of staff occasioned by the War, the diagnosis was clinical rather than microscopic, and it should be remembered in drawing deductions from the combined in- and out-patient returns that a number of Stations formerly administered by Medical Officers are now in charge of Dispensers.

5. *Malaria.*—Although the rainfall was again excessive, exceeding even the abnormal figures of the previous year, the total number of cases of malaria treated was only 3,505, as compared with 3,608 in 1916.

There were 24 cases of blackwater fever with eight deaths.

6. *Yellow Fever.*—Five cases of this disease were diagnosed during the year : three in Europeans and two in natives. The Europeans infected were all officials, two of them whilst residing in a native village when they were engaged in political work, the other in a rest house whilst travelling in the Northern Territories to the Coast in order to proceed on leave.

7. *Tuberculosis.*—Only 261 cases of this disease attended the Government Dispensaries as compared with 283 in the previous year, but the Returns from the Registrar of Deaths shew either that the disease is on the increase or that improved methods of registration are bringing more cases to light. As will be seen from the Senior Sanitary Officer's Report energetic steps are being taken to combat the disease, and to the information he has given I may add that prophylactic literature on this subject is distributed from all Government Dispensaries.

8. *Guinea-worm.*—Only 39 cases of this disease were treated in Accra during the year as compared with 123 in 1915 and 79 in 1916, a result doubtless due to the introduction of a pipe-borne water supply.

9. *Infantile Mortality.*—The Registrar of Deaths reports that the Returns for Accra shew that the infantile mortality figure for 1917 was 383·77 per 1000, but as all births are not registered this figure is too high. Inflated figures such as the above are apparently not uncommon in countries in which registration is only partial. According to the Report of the Sanitary Commissioner for Bombay for 1916, in the Bombay Municipality the rate per 1000 of deaths registered was 387·86.

During the year the subject of infant mortality in Accra was enquired into by a special Committee, and the Senior Sanitary Officer, in a memorandum submitted to the Committee, estimated the infantile mortality in Accra during the year 1915 to have been 292 per 1,000.

The following were the terms of reference submitted to the Committee :—

(*a*) At what age do native women usually marry ?

(*b*) Are any, and if so what, customs observed during the period of pregnancy ?

(*c*) What are the native customs during child-birth with regard to labour, treatment of the umbilical cord, &c. ?

(*d*) What are the native customs with respect to the after treatment of the child up to the age of three years ?

Information under this heading should be elicited as to the period of lactation, the diet of the child, especially with regard to the use of native medicines, particular enquiry being made with regard to the employment of mouth-washes (drenching) and the use of enemata (the latter probably a potent factor in the spread of dysentery and other intestinal diseases).

(*e*) What are the housing conditions of the natives generally, especially in the congested areas where so many deaths are recorded ?

Can any differentiation be traced between the mortality rates obtaining amongst Christians, Mahomedans and Pagans ?

The main conclusions of the Committee were that the excessive infant mortality is due to the improper management of labour by untrained midwives and ignorance concerning the after-treatment of both mother and child. Their chief recommendation was the establishment of a Maternity Hospital and Training Institution for midwives.

(*b*) EUROPEAN OFFICIALS.

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES OF EUROPEAN OFFICIALS.

	1915.	1916.	1917.
Total number of Officials resident	700	589	597
Average number resident	631	468	489
Total number on Sick List	346	354	534
Total number of days on Sick List	2,688	2,868	4,582
Average daily number on Sick List	7	7·8	12·5
Percentage of Sick to average number resident ...	1·10	1·66	2·55
Average number of days on Sick List for each Patient	7	8	8·58
Average sick time to each resident	4·25	6·12	9·37
Total number Invalided	21	24	19
Percentage of Invalidings to total residents	3·00	4·07	3·18
Percentage of Invalidings to average number resident	3·33	5·13	3·88
Total deaths	7	4	9
Percentage of Deaths to total residents	1·00	0·67	1·50
Percentage of Deaths to average number resident ...	1·10	0·85	1·84

The total of 4,582 days on the sick list indicates a very considerable increase over the previous two years. A study of this Return shews that 2,550 days are attributable to Tropical Diseases, the balance of 2,032 days being due to non-tropical complaints.

Of the 534 officials on the sick list 395 were civilians and 139 military; the former averaged 8·74 days on the sick list and the latter 8·08 days.

It is conceivable that the excessive rainfall, exceeding even the abnormal returns of the previous year, falling on an already water-logged soil may have increased this incidence of insect- and water-borne diseases.

10. *Causes of Invaliding of European Officials.*—Chronic Subtertian Malaria (2), Climatic Bubo (1), Enteritis (1), Gastritis (1), Insomnia (1), Injury to Shoulder (1), Injury to Forearm and Wrist (1), Malaria (2), Neurasthenia (2), Otitis and Insomnia (1), Hepatitis and Gastritis (1), Pulmonary Tuberculosis (2), Syphilis (1); total 19.

In spite of the increased incidence of disease it is satisfactory to note that the invaliding rate was 31·8 per 1,000 as compared with 40·7 per 1,000 in the previous year.

11. *Causes of Death of European Officials.*—Acute Gastro-Enteritis (1), Blackwater Fever (2), Chronic Malaria (1), Cardiac Incompetence with Dilatation (1), Malarial Fever and Pneumonia (1), Yellow Fever 3; total 9.

The death rate rose from 6·7 per 1,000 in the previous year to 15 per 1,000, but had it not been for the three unfortunate cases of Yellow Fever the figures would only have been 12 per 1,000.

(*c*) NATIVE OFFICIALS.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF NATIVE OFFICIALS.

	1915.	1916	1917.
Total number of Officials resident	1,604	1,790	1,931
Average number resident	1,534	1,701	1,882
Total number on Sick List	515	499	765
Total number of days on Sick List	4,833	4,156	6,228
Average daily number on Sick List	13	11	17
Percentage of Sick to average number resident ...	0·84	0·65	0·90
Average number of days on Sick List for each Patient	9	8·3	8·1
Average sick time to each resident	3·15	2·44	3·30
Total number Invalided	9	9	8
Percentage of Invalidings to total residents	0·56	0·5	0·41
Percentage of Invalidings to average number resident...	0·58	0·52	0·42
Total Deaths	5	10	12
Percentage of Deaths to total residents	0·31	0·55	0·62
Percentage of Deaths to average number resident ...	0·32	0·58	0·63

The figures given above indicate that the meteorological conditions, already commented on adversely, affected the health of the Native Officials.

12. *Causes of Invaliding of Native Officials.*—Chronic rheumatism (1), dilated heart with incompetency (1), hemiplegia (1), hypertrophic cirrhosis of liver (1), pulmonary tuberculosis (2), ulceration of groin and thigh (1), venereal disease (longstanding) (1); total 8.

13. *Causes of Deaths of Native Officials.*—Acute rheumatism (1), acute pleuro-pneumonia (1), bronchitis (1), malaria (1), malignant disease of liver (1), phthisis (4), pleurisy (1), pernicious anaemia (1), peritonitis (1); total 12.

(*d*) GENERAL EUROPEAN POPULATION.

(i.)	Government Officials	597
(ii.)	Employés of Trading Firms ...	718
(iii.)	Employés of Mining Companies...	718
(iv.)	Missionaries	139
	Total	2,172

Table showing the Sick, Invaliding and Death Rates of European Non-Officials.

How employed.	Number.	Deaths.	Invalided.	Death rate per cent.	Invaliding rate per cent.
1915.					
Merchants	677	10	28	1·47	4·13
Mining Companies ...	481	2	14	0·41	2·91
Missionaries	148	1	—	0·67	—
Totals	1,306	13	42	0·99	3·21
1916.					
Merchants	671	6	36	0·89	5·36
Mining Companies ...	642	3	43	0·46	6·75
Missionaries	109	1	2	0·91	1·83
Totals	1,422	10	81	0·70	5·69
1917.					
Merchants	718	11	45	1·53	6·26
Mining Companies ...	718	6	48	0·83	6·68
Missionaries	139	1	2	0·72	1·44
Totals	1,575	18	95	1·14	6·03

The most noteworthy fact revealed by the foregoing figures is that the invaliding rate of Missionaries in the Gold Coast is lower than in any other class of the European community. The same ratio, however, is not maintained in their death rate, which for the last three years works out at 7·7 per 1,000 as compared with 9·4 per 1,000 for the General Non-Official European community.

14. *Causes of Invaliding of European Non-Officials.*---Dysentery (2), enteric fever (1), malarial fever (5), chronic malaria (4), blackwater fever (13), pneumonia (1), sleeping sickness (1), syphilis (4), tuberculosis (2), miner's phthisis (3), continued fever (1), alcoholism (1), anæmia and debility (1), rheumatism (2), general debility (9), gout (1), meningitis (1), locomotor ataxy (1), syringo-myelia (1), neurasthenia (11), paralysis (1), epilepsy (1), insomnia (1), mental disease (1), mania (1), broncho-pneumonia (1), pleurisy (1), senility (1), gastritis (1), colitis (1), hernia (1), chronic constipation (1), acute hepatitis (1), jaundice (1), gallstones (1), hæmoptysis (1), fibrositis (1), inflammation of lymphatic gland (1), climatic bubo (3), cystitis (1), epididymitis (1), synovitis (1), ulcers (2), local injuries (4); total 95.

15. *Causes of Deaths of European Non-Officials.*—Subtertian malaria (1), blackwater fever (6), pneumonia (1), suicide (1), pulmonary tuberculosis (1), alcoholism (2), aneurism (1), cardiac failure (2), cirrhosis of liver (1), bright's disease (1), cause unknown (1); total 18.

EUROPEAN MORTALITY AND INVALIDING RATES, 1917.

Total Strength.	Deaths.	Invalidings.	Death rate per 1,000.	Invaliding rate per 1,000.
Official ... 597	9	19	15·07	31·82
Non Official ... 1,575	18	95	11·43	60·32
Totals ... 2,172	27	114	12·43	52·49

The European Death Rate for 1916 was 6·9 per 1,000, and the Invaliding Rate 52·2.

It will be seen that while the Invaliding Rate for 1917 is rather lower, the Death Rate is increased by more than 100 per cent. The average period of residence was considerably greater than in former years and, owing to the submarine menace and the difficulty experienced in replacing the invalided, many who in normal times would have been invalided have been allowed to remain. Whilst this factor may have diminished the Invaliding Rate it would also tend to augment the Death Rate, but it must not be forgotten that the statistics for the year with regard to Native Officials indicate that the epidemiological conditions were exceptionally unfavourable.

16. HEALTH, CLIMATE AND DISEASE IN THE GOLD COAST.

In these days an Annual Report is but a painstaking record of work carried on under adverse conditions and although considerations of economy mercifully compel brevity I make no apology for inserting an additional paragraph under the above heading.

According to Claudius Ptolemy, the author of the Ptolemaic system of the universe (A.D. 120-149), climate was determined solely by latitude, and one climate differed from another only as regards the relative length of the Mid-summer day and the relative altitude of the noontide sun.

A study of the Gold Coast Annual Medical and Sanitary Reports issued during the last years of the pre-mosquito period indicate that the belief was generally held that the health of the population was largely dependent upon the meteorological conditions. In the 1893 Report, for instance, the following passage occurs:—"In the December Quarter, 1892, " there was observed a progressive fall of the solar maximum temperatures, " a general low condition of terrestrial minimum temperatures, with a " progressive increase of the shade maximum and minimum temperatures, " an increased daily range of temperature, and relative humidity, the former " amounting in December to 16·67°, F., and the latter to 79% on the

" average in the same period, with practically no rainfall, producing a most " distressing condition of the atmosphere, with a tendency to fevers " resulting from chills, and an increased evolution of the malarial poison " owing to the favourable biological conditions for its development and " spread."

It is not surprising, therefore, to find that since the diseases that were so often fatal were believed to be due to climatic conditions it became customary to describe the climate as unhealthy, nor, as it is little more than 20 years since the discovery that many of the diseases formerly believed to be climatic were insect-borne, is it to be wondered at that the climate is so spoken of by the laity to this day.

Sir Patrick Manson, in the introduction to his work on Tropical Diseases, says :—" The more we learn about these diseases the less important in its " bearing on their geographical distribution, and as a direct pathogenic agency, " becomes the *rôle* of the temperature per se, and the more important the " influence of the tropical fauna."

Comparative Death-Rate of Various Classes in 1893.

Class.	Mortality.	Invalided.
Total Government Officials	31·25	31·25
,, Europeans at Kwitta, including Officials ..	75·00	20·00
,, Basel Missionaries	76·92	12·82
,, Catholics	115·38	115·38
,, Residents at Elmina and Cape Coast (including Govt. Officials and Catholics)	114·28	85·71
,, Mining Districts	121·21	242·42

Now we have no reason to suppose that the climatic or epidemiological conditions in the Gold Coast have undergone any material damage during the last 30 years, nevertheless if we compare the invaliding and death rates for the last thee years, given earlier in this Report, with the figures for 1893, shewn above, there can be no doubt that some new factor has arisen materially and favourably influencing the health of the European population.

Almost every Station in the Colony now boasts a segregation area, and there can, I think, be little doubt that the improved health of the European population is the direct result.

In the year 1916 a considerable amount of local excitement was created by the unexpected arrival by steamer of the wife of a European Official accompanied by her child, aged 18 months Indeed the excitement was not merely local, and echoes of it found their way into the English press.

During the month of December, 1917, no less than 25 children belonging to the Basel Mission (all of whom had been born in the Gold Coast) were assembled in Accra awaiting deportation with their parents and, by the direction of the Governor, the children were medically examined and reported on. Statistics were also obtained with regard to seven other Mission children who had been born in the Gold Coast.

The following Table, prepared by Dr. C. V. Le Fanu, gives the main facts with regard to these children :—

Station.	Families.	Children.			Brothers and Sisters.	Remarks.
		Alive.	Dead.	Prevalent Diseases.		
1. Akropong	Monninger ...	2	—	Malaria, Pneumonia	—	—
	Nothwang ...	2*	—	—	1 brother born in Europe died after vaccination ; 3 sisters born in Europe.	*The younger child, now 6 years old, born malformed and a congenital idiot.
	Jehle ...	3	—	Gastritis, Malaria	1 brother born in Europe.*	*Congenital malaria.
2. Anum ...	Zimmermann	2	—	Malaria ...	1 sister born in Europe.	—
3. Abetifi ...	Stern ...	4	—	Malaria ...	1 brother, 1 sister born in W.A.	—
4. Begoro ...	Grauer ...	3	—	—	2 brothers born in W.A.	—
	Blocher ...	1	—	Malaria ...	2 sisters born in W.A.	—
5. Nsaba ...	Maue ...	2	—	Malaria, Dysentery	1 brother born in W.A.	—
	Beck ...	1	—	—	—	—
6. Kibbi ...	Schlandraff...	4	—	Malaria, Measles, Varicela.	—	Parents look ill. All children delicate, Furunculosis.
7. Bana Hill	Ruf... ...	1	2*	Malaria ...	—	*One still-birth, one died of malaria.
—	—	25	2	—	—	—
8. Saltpond...	Müller ...	1	—	Unclassified Fever	—	—
9. Coomassie	Yost ...	2	—	Malaria ...	—	—
	Lipps ...	2	—	Malaria ...	—	—
	Bosshart ...	2	—	Malaria, Dysentry	—	—
—	—	32	2	—	—	—

GERMAN MISSION CHILDREN.

Comparative Table of Weights and Heights.

	Age, Dec., '17.		Height in inches.		Weight in lbs.	
	Years.	Months.	Actual.	Normal Average.	Actual.	Normal Average.
Male :						
Nothwang, Siegfr. Karl	7	4	42	46	54	31
Maue, Kurt Ludwig	6	10	36	45	44	48
Stern, Hermann	5	2	—	—	42	41
Stern, Werner	3	10	—	—	32	37
Blocher, Hans Gerold	3	4	36	37·25	28	35
Zimmermann, Hans Siegfr. ...	3	4	—	—	37	35
Monninger, Theod. Siegfr. ...	3	1	36	37	34	34
Schlandraff, Karl...	2	8	37	35	30	33·5
Grauer, Johannes	2	3	37	34·5	26	33
Schlandraff, Wilhelm	1	7	—	—	30	32
Monninger, Fried Johannes ...	1	6	24	33·5	20	29
Female :						
Jehle, Hedwig Barbara	5	7	36	41	42	41
Jehle, Erika Mathilda	4	3	36	38·75	42	37
Grauer, Maria Pauline	3	9	—	—	34	34·5
Schlandraff, Louice	3	8	36	37·5	34	34
Maue, Hildegard	3	3	24	37	34	32·5
Stern, Elis. Sophie	2	8	38	35	28	29½
Beck, Johanna	2	8	34	35	29	29½
Jehle, Elfrida Elis.	1	10	—	—	26	25

As a nation we have accumulated experience with regard to the conditions under which European children can be reared in the tropics and of the disabilities attaching thereto. When economical and other conditions permit they should not be allowed to reside in the tropics, neither should their importation be encouraged by the Government. On the other hand I deprecate the tendency to differentiate, in this or other respects, between the health conditions obtaining in the Gold Coast and other tropical countries. I cannot for instance regard the epidemiological conditions obtaining in the segregation area in Accra as less favourable than in many other places in the tropics where European children are permitted, indeed to think otherwise would entail the belittlement of the results obtained by the Medical and Sanitary Department during recent times, whereas I think the advancement has been considerable and encouraging.

It must not be forgotten, however, that many of the amenities of life are lacking, the most important of which, as far as children are concerned, are the lack of fresh milk and the absence of a class of native women suitable for employment as children's nurses. It will be seen that out of 34 children born in the Colony only one death had occurred, and there had been one still-birth.

Segregation was not practised by the Basel Missionaries to the extent to which it obtains in the Government segregation areas and, therefore, whatever deductions may be made from the statistics concerning them it must be remembered that the conditions under which they lived and survived were less favourable than those obtaining in the latter.

The Medical Officer, Axim, in his report for the year 1886, wrote: "As I have frequently remarked in my official reports this Colony is "overshadowed by a curse, the curse of a bad name. * * * It is useless "lamenting the fact that, to preserve the monopoly of an extraordinary "lucrative trade, merchants have damned the place by giving it a bad name "and thus crippled all attempts at developing the resources of the Colony." I do not suppose that the habit of vilification alluded to above was confined to the merchants, but there can be no doubt that, thanks to the adoption of segregation, the Gold Coast has to a great extent lived down its bad name.

As it is already rumoured that, owing to the improved health returns, revised conditions of service—extended tours and shortened leaves—are contemplated it may not be out of place here to direct attention to certain factors in West Africa that, apart from climate and epidemiological conditions, tend to differentiate it from other parts of the Tropics. Many of the amenities of life are lacking, it is a dull country, there are no hill stations, and usually officials, except for the brief week-end holidays at Christmas and Easter, obtain no relaxation from work from the day of arrival to that of their departure on leave. Moreover, owing to the inferior standard of education and attainments of the native staff as compared with other parts of the tropics, they are subject to more strain and responsibility during the whole of the service.

It is to be hoped that, in the improved health conditions that have resulted from segregation, the lessons of the past will not be forgotten and that not even the necessity for retrenchment that must inevitably result from the war will be allowed to lead us into false economics such, for instance, as any departure from the principles of segregation. We must not forget that in a country in which yellow fever is endemic segregation is the most practicable and economical solution of the epidemiological problem.

III.—SANITATION.

A.—GENERAL REVIEW OF WORK DONE, LAWS PASSED, AND PROGRESS MADE.

(i.) ADMINISTRATIVE.

In spite of the shortage in both staff and materials which has occurred on account of the war, routine sanitation work has been well maintained, the ready and willing assistance given by members of the Political Staff having contributed in no small way to this result.

Visits of inspection have been limited and chiefly confined to those of routine, such as inspection of the stations on the Seccondee-Coomassie and Accra-Tafo Railways by the Medical Officers of Health. As a result of these visits definite recommendations were made, which, it is hoped, will bear fruit some day. At the end of the year the Senior Sanitary Officer was able to get away on a tour of inspection to the more important towns in the Central and Western Provinces and to Coomassie.

The river Volta rose to an exceptional height at the end of the rains and Kpong suffered severely, nearly every house in the town proper was damaged, while a large number collapsed. The town has been surveyed and advantage will be taken of this opportunity for a new lay-out.

As a result of the mining activity in connection with the Manganese Mine on the Dagwin Concession, the village of Akyem increased very rapidly. It has been brought under the Towns Ordnance and all developments will be in accordance with the lay-out plan that has been made. There is also a mine village under the control of the Mines Management. If the demand for this ore remains constant after the war, it is hoped that a new mines village will be laid out on the same excellent lines as the new Abbontiakoon Mines village.

No new Ordinance having any bearing on Public Health was passed during the year but the following Orders-in-Council and Rules were made under previously existing Ordinance :—

UNDER THE INFECTIOUS DISEASES ORDINANCE NO. 2 OF 1908.

Order-in-Council		No. 3	of 1917	...	Ofako declared an infected area.
Do.	do.	No. 5	do.	...	Accra do. do. do.
Do.	do.	No. 6	do.	...	Temma do. do. do.
Do.	do.	No. 11	do.	...	Revoking No. 3.
Do.	do.	No. 12	do.	...	,, No. 5.
Do.	do.	No. 13	do.	...	,, No. 6.
Do.	do.	No. 14	do.	...	Great Ningo declared an infected area.
Do.	do.	No. 17	do.	...	Great Ningo Order revoked.
Do.	do.	No. 22	do.	...	Pulmonary tuberculosis declared an infectious disease.
Do.	do.	No. 31	do.	...	Axim declared an infected area.

Rules Nos. 3 and 4 of 1917, under Section 18 of the Ordinance.

Rule No. 3 (Ashanti), Notification of Cases of Small-pox or Anthrax by Chiefs.

Under the Towns Ordinance No. 13 of 1892.

Order-in-Council No. 2 of 1917	...	Town of New Mangoase a Health Area.
Do. do. No. 7 do.	...	Boundaries of New Tafo re-arranged.
Do. do. No. 19 do.	...	Jumapo brought under the Towns Ordinance.
Do. do. No. 28 do.	...	Akyem brought under the Towns Ordinance.
Rule 7 of 1917	...	Tarquar Market Rules.

Under Births, Deaths and Burials Ordinance No. 3 of 1912.

Rule 21 of 1917	...	Fixing hours for burials in Government Cemeteries.

(ii.) PREVENTIVE MEASURES AGAINST—

(1) Mosquito and Insect-borne Diseases.

(*a*) *Mosquitoes.*

Malaria, Dengue, Yellow Fever, Filariasis.—As in former years action against the mosquito in its many and varied breeding places has been constant, and has been vigorously carried on at all the main stations. The anti-mosquito measures include—drainage and filling, house-to-house inspection, clearance of bush and undergrowth, upkeep of mosquito brigades, oiling and filling pools, eaves gutter inspections, filling holes and crevices in trees, screening of tanks, barrels and wells, and fumigation.

Owing to the threatened shortage of quinine the free distribution of this drug as a prophylactic has been discontinued until after the war.

The rainfall of 1916 was much above the average, but that of 1917 was heavier still. As a result of the waterlogged condition of the ground and consequent pool formation, reports from the various stations were unanimous in drawing attention to the increase in the number of mosquitoes.

During the year five cases of yellow fever were diagnosed, including three Europeans. All the cases were fatal. Four of the cases occurred in the Colony, and the fifth, presumably, received his infection in the Northern Territories. Both natives were from the Kroo Coast, but had been resident in the Colony for some months.

Two of the Europeans got their yellow fever infection at Ningo, and the following paragraph from Reindorf's "History of the Gold Coast" is interesting in this connection as suggesting the presence of yellow fever in Ningo as far back as 1770 :—

> "Missionaries Schenk, Bradly, Watson and Westman left "Copenhagen in October, 1769, and arrived at Christiansborg on the "9th February, 1770. Schenk, Bradly, Hall and Watson started on "March 9th to Ningo. They bought a piece of land and began to "build their station ; at the same time they preached and taught the "people ; Westman and Kleffel remained at Christiansborg. On "March 25th and 28th both Watson and Schenk got attacks of fever, "so Bradly asked Westman to come down to Ningo, when he arrived "April 2nd. Watson died on the 10th, and the rest soon followed "one after another. Westman, who survived, embarked for Europe "and died five days after on the sea."

Towards the end of the year six cases of dengue were reported from Accra. No special preventive measures were undertaken.

(*b*) *Tsetse Flies.*

Bush clearing, especially at the fords and watering places, is the principal measure adopted. Cases of trypanosomiasis are isolated in fly-proof wards. In Accra bye-laws for the regulation of the keeping of animals came into force during the year. They empower the Medical Officer of Health to order the examination of animals suspected of being infected, and if proved to be infected to give instructions as to their disposal.

(2) INFECTIOUS AND EPIDEMIC DISEASES.

Both chicken-pox and measles are very common and a number of outbreaks have been reported. Where necessary patients are isolated, but as a rule they are treated at home.

According to the deaths returns dysentery maintains its place as a common cause of death among natives, but as a large proportion of such deaths are not registered on medical certificate and as it is impossible to rely on the native description of any form of sickness, it is possible that some of these deaths may have been due to other diseases of the alimentary tract. In Accra 194 deaths, or 21 % of the total deaths, were registered as being caused by either dysentery or diarrhœa as against 16 % and 10 % in 1916 and 1915 respectively.

One case of enteric fever was reported from Accra, the cause of death being diagnosed at a post-mortem ordered by the Coroner, while six cases were treated at the hospital, Seccondee, with one death. All the cases were in natives.

Plague.—On the 5th March the existence of plague in the Accra district was definitely established. It made its appearance first at Ofako and later on in the same month at Temma, and one non-imported case occurred in Accra. The course of the outbreak and the method in which it was dealt with have formed the subject of special reports and do not require any further reference here. Six cases were seen with six deaths, but it is estimated that there were at least 39 deaths.

As it is recognised in India that a mean temperature of 80° or over with a saturation deficiency of ·30 of an inch or over has a distinct effect in influencing the incidence and spread of plague in epidemic form, a table (Appendix I.) is attached giving the monthly mean temperature, saturation deficiency and rainfall of Accra for the years 1907-1917 and those months in which cases of plague were diagnosed in the Accra district in the outbreaks of 1907-8 and 1917 are underlined. It would appear from this table that the climatic conditions in this district are nearly always favourable to the incidence and spread of plague and that, therefore, there must be some unknown factor which has prevented its epidemic spread hitherto. In his "Treatise on Plague," Professor Simpson says:—"Season with its meteorological factors is " a complete force and as such operates in more than one way on the agents and " media connected with plague. The difficulty lies in differentiating the main " factors of which season is composed and in determining the exact influence of " each on man, the plague germ, and on animals and insects concerned in the " spread of plague."

It was not found possible to trace the origin of the outbreak of plague in 1908 or to prove that it had been introduced from without. The same applies to the present outbreak and it would appear, therefore, correct to assume that plague is another of the endemic diseases that we have to be on the outlook for on the Gold Coast.

On page 93 of the Annual Medical and Sanitary Report of the Gold Coast for 1912 an extract is given from the Annual Medical and Sanitary Report of the Gold Coast for 1892 in which there is a description of an outbreak of "Influenza," which occurred towards the end of 1891 and rapidly became malignant at the beginning of 1892 "so rapidly fatal and otherwise malignant that a state of panic was induced amongst the natives," and the opinion is expressed that the disease diagnosed as influenza in 1891 and 1892 must have been pneumonic plague. As interesting in this connection, the monthly mean temperatures and saturation deficiencies for the years 1889-1892 are included in the table above mentioned. It will be seen that these are very similar to those of 1907-1917 and according to Indian experience distinctly favourable to the incidence and spread of plague.

In the larger towns, and in the stations along the Seccondee-Coomassie and Accra-Tafo railways, every effort was made towards the wholesale destruction of rats and in addition to the employment of rat catchers, encouragement was given in the form of cash payment for each rat brought in.

Outbreaks of small-pox were reported from Ashanti and the Northern Territories: in all there were 358 cases with 62 deaths. One case was reported in the Colony. Medical Officers were detailed for the purpose of dealing with the outbreaks.

VACCINATION FIGURES.

		1916.	1917.
Total number vaccinated	...	10,313	21,293
Total number successful...	...	7,848	15,619

A large number of those classified as unsuccessful were not seen again after vaccination.

Anthrax.—Two cases of malignant pustule with recovery were reported during the year. From time to time cases were reported amongst cattle in the Northern Territories, but as far as is known there was no epidemic outbreak.

Rinderpest.—Early in the year a valuable report on the subject of the prevalence of Rinderpest in the Northern Territories, Ashanti and the Colony was presented by Dr. G. E. H. Le Fanu. As far as possible precautions were taken to prevent the spread of the disease, but owing to the usual indifference of the native when there is no legislation to enforce measures of segregation and isolation, cattle plague made its appearance amongst the non-imported cattle in the Accra district and these suffered very severely.

(3) ENDEMIC DISEASES.

Tubercular Disease.—Death returns shew that tuberculosis is on the increase and certainly the average native house and mode of life are ideal for the spread of the disease. During the year it was made an infectious disease under the Infectious Diseases Ordinance and notification by all Government Medical Officers made compulsory. Supervision is exercised over all cases thus notified, the house and clothing disinfected, and disinfectant supplied for use in spittoons. The patients are warned about the danger of conveying infection to their relatives and friends and the other inmates of the house are also warned of the danger. Sanitary Inspectors are giving special lectures on the disease and its prevention.

With regard to the remainder of Epidemic Diseases and Helminthic Diseases there is little to add to what has been written in former reports. Ankylostomiasis has been specially reported on as being very common in the coast villages in the Axim and Saltpond districts, and the Medical Officers have endeavoured to make the natives understand the nature of the disease, the methods of prevention and the necessity for early treatment.

(iii.) GENERAL MEASURES.

General supervision and routine inspections have been well maintained during the year. The amount of clearing of bush and undergrowth that has had to be done being in excess of that of previous years on account of the unusually heavy rainfall.

The total number of house-to-house inspections made during the year was 339,258 and larvæ were found in 3,397 cases.

The number of prosecutions for various sanitary offences were 9,174; there were 8,897 convictions, and fines amounting to £2,708 1s. 6d. were inflicted.

Under the Sanitary Improvement Vote £19,700 was spent on various improvement schemes.

Further sites have been allotted to mercantile firms in the Accra Segregation Area and applications have been received for sites in the Tafo Segregation Area.

Water Supplies.—The pipe-borne supply for Seccondee was opened by His Excellency in July, 1917. The chemical and bacteriological examinations of the Accra and Seccondee water supplies show that the water as at present supplied to the public still leaves much to be desired. Experiments are being made at Accra to determine what action should be taken in order to reach the desired standard of purity.

B.—MEASURES TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

No opportunity is lost in spreading the knowledge of hygiene and sanitation in as simple and effective manner as possible.
The subject of hygiene continues to be taught in a simple and practical manner in all schools under Government supervision.

C.—RECOMMENDATIONS FOR FUTURE WORK.

During the continuance of the War every effort has to be made to cut down expenditure. It is not a suitable time, therefore, to make recommendations which will involve extra expenditure on staff and works.

D. ALEXANDER,
Senior Sanitary Officer.

ACCRA,
27*th March*, 1918.

IV.—METEOROLOGY.

17. The rainfall exceeded even the abnormal figures of the previous year:—

RAINFALL IN INCHES.

Station.	1915.	1916.	1917.
Accra	22·81	41·05	44·20
Aburi	49·65	48·66	73·16
Cape Coast	33·84	53·62	56·25
Seccondee	33·89	37·67	56·76
Axim	81·25	110·45	94·50
Tarquah	51·58	77·08	92 62
Coomassie	52·18	60·79	71·40
Tamale	42·65	45·52	35·76

V.—HOSPITALS AND DISPENSARIES.

18. A scheme has been under consideration for rendering the benefits of European medical science more accessible to the aboriginal population, and after the war it is proposed to establish Dispensaries under the supervision of travelling Medical Officers at various centres in the Colony and Ashanti. A plan of the building proposed is attached to this Report, Appendix A.

A new Hospital for women on the separate ward system was erected at Cape Coast.

PRISONS.

19. The general health of the prisoners was satisfactory.

	1915.	1916.	1917.
Total convicts	6,480	6,169	6,525
Total sick	677	527	990
Total deaths	20	26	27

VI.—SCIENTIFIC.

20. A number of interesting observations and record of painstaking work will be found in the Report of the Accra Laboratory which, for reasons of economy, is this year attached as an Appendix to the present Report.

THOS. E. PRICE,
Principal Medical Officer.

10*th April*, 1918.

TABLE IV.

1.—NAME OF TOWN.

Station.	1916.		1917.	
	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.
Accra	4½ sq. miles	26	4½ sq. miles	26
Cape Coast	2½ sq. miles	3	2½ sq. miles	3
Seccondee	3 sq. miles	3	3 sq. miles	3
Coomassie	9 sq. miles	—	9 sq. miles	—

2.—POPULATION.

Station.	1916.					1917.				
	Natives.		Europeans.		Total.	Natives.		Europeans.		Total.
	Males.	Females.	Males.	Females.		Males.	Females.	Males.	Females.	
Accra ...	14,000	11,000	200	25	25,225	14,000	11,000	200	25	25,225
Cape Coast ...	5,326	5,149	35	7	11,117	5,188	5,620	35	8	10,851
Seccondee ...	6,621	6,780	149	12	13,562	7,396	4,096	97	9	11,598
Coomassie ...	11,000	11,000	99	5	22,160 56 Syrians.	13,045	17,022	106	6	30,179

3.—HOUSING.

Station.	1916.				1917.			
	Houses.		Huts.		Houses.		Huts.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra	142	2,972	See Houses.		142	2,750	See Houses.	
Cape Coast	22	1,317	—	318	21	1,317	—	318
Seccondee	78	1,250	—	—	89	1,257	—	—
Coomassie	41	1,000	—	—	46	2,721	—	763

4.—MOSQUITO PROTECTION OF HOUSES.

Station.	1916.				1917.			
	Number of houses wholly protected.	Number of Houses with Mosquito-proof room.	Made wholly protected in 1916.	Partially protected in 1916.	Number of houses wholly protected.	Number of houses with Mosquito-proof room.	Made wholly protected in 1917.	Partially protected in 1917.
Accra	—	35	—	—	—	35	—	—
Cape Coast	—	4	—	—	—	4	—	—
Seccondee	—	22	—	—	—	22	—	—
Coomassie	—	14	—	—	—	16	—	2

TABLE IV.—*continued.*

5 (A).—ERECTION OF NEW BUILDINGS DURING THE YEAR.

Station.	1916.					1917.				
	Public Buildings with full sanction.	Houses with full sanction.	Huts with full sanction.	Houses without sanction.	Huts without sanction	Public Buildings with full sanction.	Houses with full sanction.	Huts with full sanction.	Houses without sanction.	Huts without sanction.
Accra	3	252	—	—	242	—	232	9	—	510
Cape Coast ...	1	14	3	—	—	3	—	2	—	—
Seccondee ...	8	67	—	—	—	1	22	—	—	—
Coomassie ...	—	32	—	6	—	—	57	—	2	—

5 (B).—ACTION TAKEN.

Station.	1916.				1917.			
	Number of prosecutions.		Number demolished.		Number of prosecutions.		Number demolished.	
	Huts.	Houses.	Huts.	Houses.	Huts.	Houses.	Huts.	Houses.
Accra	—	—	507	20	—	—	366	7
Cape Coast... ...	—	2	—	—	—	3	—	—
Seccondee	—	—	—	50	—	—	—	49
Coomassie	—	6	—	4	—	—	4	9

6.—MARKETS.

Station.	1916.			1917.		
	Number.	Paved and Drained.	Unpaved.	Number.	Paved and drained.	Unpaved.
Accra	2	2	—	2	2	—
Cape Coast	1	—	1	1	1	—
Seccondee...	4	3	1	2	2	—
Coomassie...	2	1	1	2	1 & 1 partly	—

7.—SLAUGHTER HOUSES.

Station.	1916.			1917.		
	Number.	Paved and Drained.	Unpaved	Number.	Paved and Drained.	Unpaved.
Accra	1	1	—	1	1	—
Cape Coast	1	1	—	1	1	—
Seccondee...	2	2	—	2	2	—
Coomassie...	2	2	—	2	2	—

TABLE IV.—*continued.*

8. LATRINES.

Station.	1916.																1917.															
	Number.				New Ones.				Repaired.				Demolished.				Number.				New Ones.				Repaired.				Demolished.			
	Male.		Female.		Male.		Female.		Male.		Female.		Male.		Female.		Male.		Female.		Male.		Female.		Male.		Female.		Male.		Female.	
	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats	Number.	Seats
Accra	36	425	34	202	—	—	—	—	—	—	—	—	—	—	—	—	38	449	36	226	2	24	2	24	7	56	7	56	—	—	—	—
Cape Coast ...	11	144	9	144	—	—	—	—	11	—	9	—	1	8	1	8	11	144	9	144	—	—	—	—	5	—	5	—	—	—	—	—
Seccondee ...	12	102	8	64	1	4	—	—	2	14	2	14	1	6	1	6	12	119	8	64	—	—	—	—	5	53	4	43	1	12	—	—
Coomassie ...	27	244	25	238	1	13	1	13	—	—	—	—	—	—	—	—	30	262	28	257	3	18	3	18	—	—	—	—	—	—	—	—

8. LATRINES (PRIVATE).

Station.	1916.									1917.								
	Number.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.	Cesspools regularly oiled.	Number.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of nightsoil men.	Cesspools.	Cesspools cleansed.	New Cesspools.	Cesspools abolished.	Cesspools regularly oiled.
Accra	230	594	37	66	—	—	—	—	—	262	615	53	57	—	—	—	—	—
Cape Coast	99	846	8	30	10	—	—	1	—	95	863	5	30	10	—	—	—	—
Seccondee	235	254	27	—	—	—	—	—	—	160	189	389	31	—	—	—	—	—
Coomassie	127	341	170	38	—	—	—	—	—	102	399	200	60	—	—	—	—	—

TABLE IV.—*continued.*

9. REMOVAL OF REFUSE.

STATION.	1916.						1917.					
	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.
Accra	39	13	86	—	4	36	39	13	80	4	3	41
Cape Coast	39	11	67 cart-loads	1	1 cart-load	34	39	11	67 cart-loads	1	1 cart-load	34
Seccondee	20	9	28 cart-loads	2	4 cart-loads	60	20	9	28 cart-loads	—	38 head-loads	30
Coomassie	—	20 wheel barrows and 2 carts	71 head-loads	1	71 head-loads	23	—	20 wheel barrows and 1 cart	85·5 head-loads	1	85 head-loads	23

10. MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

STATION.	1916.												1917.											
	Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.			Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.		
	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads offal per day.
Accra	—	18	—	—	—	—	595	—	5 h-ld.	—	68	—	—	18	—	—	—	—	613	—	5	—	82	—
Cape Coast	—	1	1/15 h-ld.	—	66	—	777	—	1/7	—	—	—	—	1	1/15 h-ld.	—	66	—	863	—	1/7	—	—	—
Seccondee	254	—	—	—	28	—	—	—	1½	—	—	—	189	28	—	—	—	—	—	—	—	—	—	2 bkt. fulls.
Coomassie	341	—	30	—	143	—	—	—	—	—	—	—	399	—	—	—	88·5 h-lds.	31·4 h-lds.	—	—	—	—	—	—

TABLE IV.—*continued.*

11.—AVERAGE DAILY NUMBER OF CARTLOADS OF CANS, BOTTLES AND INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES AND COMPOUNDS.

STATION.	1916.	1917.
Accra	18	25
Cape Coast	1	1
Seccondee	4	2
Coomassie	53 head-loads.	73·9

12.—WATER SUPPLY.

Station.	PIPE-BORNE WATER.				WELLS.				TANKS.															BARRELS.	
					Public.		Private.		Public.						Private.						Native.				
	Source.	Linear yards.	Public stand pipes.	Private stand pipes.	No.	M.P., &c.	No.	M.P., &c.	Under-ground.	M.P., &c., pump.	Above ground.	M.P.	400 gallons or less.	Above 400 gallons.	Under-ground.	M.P., &c., pump.	Above ground.	M.P.	400 gallons or less.	Above 400 gallons.	Wood.	Iron.	Con-crete.	No.	M.P.
Accra	River Densu	42,174	44	285	—	—	130	120	14	14	70	70	24	60	40	40	60	60	30	70	10	65	25	190	190
Cape Coast	—	—	—	—	9	5	256	237	13	13	14	14	—	27	57	57	116	116	116	—	10	102	4	426	356
Seccondee	Anan-kwan River	23,696	27	17	8	8	210	198	—	—	—	—	—	—	67	67	226	217	—	293	7	219	67	135	428
Coomassie	—	—	—	—	14	6	203	179	—	—	—	—	—	—	2	2	33	32	—	35	8	25	2	93	83

TABLE IV.—*continued.*

13.—DRAINAGE. (Public).

Station.	1916				1917				1916			1917		
	Masonry Drains.								Earth Drains.					
	Lineal Yards	Lineal Yards Re-constructed	Lineal Yards Repaired	Lineal Yards Con-structed	Lineal Yards	Lineal Yards Re-constructed	Lineal Yards Repaired	Lineal Yards Con-structed	Lineal Yards Cleaned	Lineal Yards Dug	Frequency of Cleaning	Lineal Yards cleaned	Lineal Yards Dug	Frequency of Cleaning
Accra	32,171	—	—	5,630	34,516	—	—	2,345	16,596	345	Every 2 months	—	440	Every 2 months.
Cape Coast	18,614	—	3,543	99	18,913	12	6	172	2	200	Continuously	—	274	Continuously
Seccondee	—	30	—	52	—	—	125	953	355	120	Quarterly	2,327	955	Twice in a Quarter.
Coomassie	7,770	—	200	490	7,770	—	—	—	54,762	—	4 times monthly	50,310	1,589	4 times monthly.

14.—CLEARANCE OF UNDERGROWTH, GRASS, WEEDS, &C.

Station.	1916.		1917.	
	Square Yards Grass, &c., cut and removed.	Frequency of Clearance.	Square Yards Grass, &c., cut and removed.	Frequency of Clearance.
Accra	3,929,638	Four times a year.	2,878,518	Four times a year.
Cape Coast	1,253,068	Continuously.	361,931	Continuously.
Seccondee	3,458,440	Quarterly.	583,618	Quarterly.
Coomassie	1,204,984	Every six weeks.	2,491,504	Every six weeks.

TABLE IV.—*continued.*

15.—EXCAVATIONS AND LOW-LYING LAND.

Station.	1916.							1917.						
	Pools and excavations.	Excavations filled up.	Amount of marsh raised and drained.	Pools, streams, &c., fish stocked.	Cubic yards material used for filling in.	Persons fined for making excavations.	Men employed daily for filling in.	Pools and excavations.	Excavations filled up.	Amount of marsh raised and drained.	Pools, streams, &c., fish stocked.	Cubic yards material used for filling in.	Persons fined for making excavations.	Men employed daily for filling in.
Accra	58	58	2,420	—	16,152	—	45	17	17	1½ acres	—	6,405	—	45
Cape Coast	1	—	304 sq. yds.	—	Many cart-loads	2	4	—	—	5,166 cubic yds.	—	Many cart-loads	—	4
Seccondee	3	—	3,433 sq. yds.	—	24,015	—	—	266	146	—	—	49,200	—	10
Coomassie	1	15	100 sq. yds.	202	Not estimated	—	1	—	20	Not estimated.	220	Not estimated	—	1

16. OILING.

Station.	1916.				1917.			
	Drains oiled.	Pools and excavations oiled.	Tanks and barrels oiled.	Men employed daily for oiling.	Drains oiled.	Pools and excavations oiled.	Tanks and barrels oiled.	Men employed daily for oiling.
Accra	817	1,741	2,565	4	967	3,208	2,441	4
Cape Coast	288	494	404	4	285	261	747	4
Seccondee	2,675	1,118	55	2	155	266	69	5
Coomassie	3,227	5,348	90	2	7,972	8,195	—	4

TABLE IV.—*continued.*

17.—INSPECTIONS AND PROSECUTIONS.

Station.	1916.								1915.							
	Inspectors Employed.	Houses Inspected.	Houses where Larvæ were found.	Notices against Larvæ.	Persons fined for Larvæ.	Notices re Insanitary Conditions.	Persons fined for Insanitary Conditions.	No. of Soda and Aerated Factories Inspected.	Inspectors Employed.	Houses Inspected.	Houses where Larvæ were found.	Notices against Larvæ.	Persons fined for Larvæ.	Notices re Insanitary Conditions.	Persons fined for Insanitary Conditions.	No. of Soda and Aerated Factories Inspected.
Accra	12	65,334	241	430	187	581	431	—	12	80,112	507	278	449	634	1	—
Cape Coast ...	12	31,246	419	673	335	44	16	—	12	26,428	410	309	425	94	3	—
Seccondee ...	8	104,799	403	807	349	766	146	—	10	66,596	401	804	322	489	118	1
Coomassie ...	6	37,287	466	6	255	22	1,274	1	6	30,248	306	138	247	281	2,789	1

APPENDIX I.

a = Mean monthly temperature. *b* = Mean monthly saturation deficiency in inches. *c* = Rainfall in inches.

Year.	January.			February.			March.			April.			May.			June.			July.			August.			September.			October.			November.			December.			Total Rainfall in Inches.
	a	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	
1907	75	·11	·14	76	·14	·30	80	·31	2·24	78	·29	4·62	79	·34	10·10	76	·20	13·88	76	·17	3·73	73	·36	—	76	·21	·46	77	·28	·70	79	·34	—	79	·30	·50	36·67
1908	79	·24	2·50	79	·28	·43	79	·32	1·77	80	·28	6·76	79	·25	2·10	79	·27	5·40	78	·23	1·33	75	·18	—	76	·20	1·52	78	·24	1·66	80	·26	1·44	76	·16	·20	25·11
1909	76	·27	1·51	75	·11	2·85	74	·21	1·55	73	·10	2·15	73	·06	3·45	72	·08	8·95	72	·13	·30	72	·08	1·05	72	·11	1·04	72	·07	·32	75	·09	1·60	75	·13	2·16	26·93
1910	73	·05	—	75	·12	3·10	72	·08	·90	75	·13	2·11	73	·05	4·14	75	·16	18·58	69	·12	3·22	72	·14	2·43	74	·23	·35	76	·33	2·43	77	·30	1·60	83	·27	·66	39·52
1911	78	·13	·80	78	·20	—	80	·30	5·12	78	·27	3·33	79	·41	6·20	77	·21	20·68	75	·18	·14	73	·20	—	76	·24	·26	78	·21	·14	79	·18	3·26	78	·35	·16	40·09
1912	79	·24	·72	79	·21	·20	78	·38	·12	84	·20	6·03	77	·23	3·00	76	·19	3·63	77	·23	3·52	79	·24	—	77	·21	·80	79	·20	·45	77	·20	2·06	78	·20	—	20·53
1913	81	·24	—	80	·25	6·26	81	·26	1·24	82	·25	2·43	76	·32	4·75	75	·22	4·23	79	·33	5·28	78	·24	1·73	81	·26	—	79	·23	2·04	76	·21	1·22	78	·18	—	29·18
1914	80	·30	·32	81	·30	·35	82	·28	·52	81	·21	3·61	80	·24	4·04	78	·21	11·79	76	·14	·25	76	·23	·53	76	·25	—	75	·20	·52	79	·29	1·20	79	·20	1·45	24·58
1915	78	·24	—	79	·27	·45	79	·32	2·04	79	·38	2·31	84	·39	3·52	78	·29	8·76	77	·31	2·13	76	·17	·42	79	·25	·56	80	·31	·30	79	·33	1·22	81	·25	1·10	23·81
1916	80	·25	—	82	·28	—	82	·28	1·89	81	·19	1·34	81	·29	4·31	78	·24	21·13	75	·18	3·34	75	·13	1·25	77	·16	1·48	79	·30	5·77	80	·28	·33	80	·24	·21	41·05
1917	80	·20	2·82	80	·17	·24	80	·13	1·61	81	·15	2·44	81	·17	10·43	80	·09	5·38	78	·22	8·89	77	·17	2·49	89	·11	5·25	80	·10	2·43	81	·14	1·50	82	·24	·72	44·20
1889	83	·27	—	85	·31	·16	87	·34	·21	86	·32	2·67	83	·23	6·01	83	·24	4·75	77	·18	3·96	76	·17	·17	76	·19	·80	79	·24	2·12	80	·35	2·25	81	·30	—	19·03
1890	80	·23	—	81	·29	1·06	81	·34	3·44	80	·30	6·58	80	·27	5·40	72	·19	4·94	76	·26	·96	74	·15	·41	75	·18	·26	78	·23	2·57	78	·26	2·11	79	·28	1·80	29·53
1891	83	·24	—	84	·23	—	81	·29	2·01	81	·34	2·33	79	·23	6·84	78	·19	6·82	74	·12	4·16	72	·17	·06	74	·21	·02	78	·23	1·92	79	·27	3·37	77	·27	·27	27·50
1892	80	·21	1·59	81	·28	·37	81	·31	·50	80	·27	6·70	78	·19	11·30	77	·20	4·16	78	·18	—	73	·20	·18	76	·18	·95	78	·27	3·17	79	·29	1·85	81	·23	·07	30·84
														X			X																				

X The observer remarks : "Catarrhal affections assumed almost an epidemic form."

———————— Months in which Plague occurred.

………………………… Months in which "Malignant Influenza" occurred.

TABLE V.

RETURN OF DISEASES AND DEATHS (IN AND OUT-PATIENTS) FOR THE YEAR 1917.

Disease.	Remaining in Hospital at end of 1916.	Yearly Total.		Total Cases treated.	Remaining in Hospital at end of 1917.	Remarks.
		New Cases.	Deaths.			
INFECTIVE DISEASES.						
Beri-Beri	4	11	5	15	—	
Chicken-Pox	3	338	—	341	7	
Dengue	—	7	—	7	—	
Dysentery { Amœbic ...	—	9	1	9	—	
Dysentery { Type undetermined ...	1	509	8	510	4	
Enteric	—	10	1	10	—	
Erysipelas	—	11	—	11	—	
Gonorrhœa	5	1,197	1	1,202	2	
Influenza	—	280	—	280	—	
Leprosy—						
(*a*) Nodular	8	13	—	21	3	
(*b*) Anæsthetic ...	1	7	—	8	1	
Malaria—						
(*a*) Tertian	2	506	—	508	—	
(*b*) Quartan	—	25	—	25	—	
(*c*) Aestivo-Autumnal	2	1,684	10	1,686	1	
(*d*) Chronic Malaria	—	168	—	168	3	
(*e*) Blackwater ...	2	22	8	24	—	
(*f*) Typeundetermined	—	1,096	1	1,096	9	
Measles	—	82	—	82	2	
Plague	—	6	6	6	—	
Pneumonia	3	233	23	236	—	
Relapsing Fever ...	—	3	—	3	—	
Rheumatic Fever ...	1	16	4	17	—	
Septicæmia	2	5	1	7	—	
Trypanosomiasis (Sleeping Sickness)	1	12	6	13	—	
Small-Pox	—	25	3	25	—	
Syphilis—						
(*a*) Primary	2	65	—	67	—	
(*b*) Secondary ...	—	225	3	225	3	
(*c*) Inherited... ...	—	18	—	18	—	
Tetanus	—	12	2	12	—	
Tuberculosis	3	258	24	261	3	
Whooping Cough ...	—	262	—	262	—	
Yaws	—	362	—	362	—	
Yellow Fever	—	5	5	5	—	
Pyrexia of unknown origin	—	868	1	868	1	
Other Diseases	—	158	—	158	—	
INTOXICATIONS.						
Alcoholism	—	17	2	17	—	
GENERAL DISEASES.						
Anæmia	—	154	—	154	—	
Anæmia-Pernicious ...	—	5	—	5	—	
Diabetes...	—	6	—	6	—	

Disease.	Remaining in Hospital at end of 1916.	Yearly Total.		Total Cases treated.	Remaining in Hospital at end of 1917.	Remarks.
		New Cases.	Deaths.			
GENERAL DISEASES—*contd.*						
Exophthalmic Goitre ...	—	2	—	2	—	
Gout	—	8	—	8	—	
Leucocythæmia	—	1	—	1	—	
Hodgkin's Disease ...	—	1	1	1	—	
Rickets	—	1	—	1	—	
Chronic Rheumatism ...	1	1,293	—	1,294	3	
Debility	1	234	—	235	1	
Other Diseases	—	267	—	267	1	
LOCAL DISEASES.						
Diseases of the Nervous System :—						
Sub-section 1.						
Neuritis	—	48	—	48	—	
Meningitis	—	13	2	13	—	
Hydrocephalus	—	11	—	11	—	
Congestion of Brain ...	—	1	—	1	—	
Other Diseases	—	5	—	5	—	
Sub-section 2.						
Apoplexy	—	5	2	5	—	
Paralysis...	1	53	4	54	6	
Chorea	—	1	—	1	—	
Epilepsy	—	34	2	34	—	
Neuralgia	—	246	—	246	—	
Hysteria	—	11	—	11	—	
Other Diseases	—	110	—	110	—	
Sub-section 3.						
Mental Diseases :—						
Idiocy	1	—	—	1	—	
Mania	—	10	—	10	—	
Dementia	—	3	—	3	1	
Delusional Insanity	1	11	—	12	—	
Other Diseases ...	—	1	—	1	—	
Diseases of the Eye :—						
Conjunctivitis ...	—	1,429	—	1,429	—	
Keratitis	—	33	—	33	—	
Ulceration of Cornea	—	111	—	111	—	
Iritis	—	60	—	60	1	
Optic Neuritis ...	—	6	—	6	—	
Cataract	—	53	—	53	—	
Other Diseases ...	—	111	—	111	—	
Diseases of the Ear :—						
Inflammation ...	1	636	—	637	—	
Other Diseases ...	—	217	—	217	—	
Diseases of the Nose ...	1	124	—	125	—	
Diseases of the Circulatory System :—						
Pericarditis ...	—	6	1	6	—	
Endocarditis ...	—	3	1	3	—	
Valvular Mitral ...	—	69	4	69	—	
,, Aortic ...	—	19	—	19	—	
,, Tricuspid	—	1	—	1	—	
Arterial Sclerosis ...	—	6	—	6	—	
Aneurism	—	6	—	6	1	
Other Diseases ...	—	66	8	66	3	

Disease.	Remaining in Hospital at end of 1916.	Yearly Total.		Total Cases treated.	Remaining in Hospital at end of 1917.	Remarks.
		New Cases.	Deaths.			
LOCAL DISEASES—*contd.*						
Diseases of the Respiratory System :—						
Laryngitis	—	88	—	88	—	
Bronchitis ...	—	3,703	5	3,703	—	
Broncho-Pneumonia	1	68	2	69	—	
Abscess of Lung ...	—	4	—	4	—	
Gangrene of Lung...	—	5	—	5	—	
Pleurisy	1	174	4	175	—	
Empyema	—	24	—	24	—	
Other Diseases ...	—	673	2	673	—	
Diseases of the Digestive System :—						
Stomatitis	—	454	—	454	—	
Caries of Teeth ...	—	872	—	872	—	
Glossitis	—	32	—	32	—	
Sore Throat ...	—	172	—	172	—	
Inflammation of Tonsils	—	255	1	255	—	
Gastritis	1	445	—	446	2	
Ulceration of Stomach ...	—	1	—	1	—	
Hæmatemesis ...	—	1	—	1	—	
Dilatation of Stomach	—	4	—	4	—	
Stricture of Stomach	—	1	1	1	—	
Dyspepsia	—	738	—	738	—	
Enteritis	1	140	6	141	—	
Appendicitis ...	—	25	1	25	—	
Colitis	—	27	1	27	—	
Hernia	—	151	5	151	2	
Diarrhœa	—	1,200	1	1,200	—	
Constipation ...	2	4,192	—	4,194	—	
Colic	—	524	1	524	—	
Hæmorrhoids ...	—	158	—	158	1	
Pancreatitis ...	—	1	1	1	—	
Hepatitis—Acute ...	1	123	—	124	—	
Abscess-Hepatic ...	—	20	2	20	—	
Cirrhosis	—	28	7	28	1	
Jaundice	—	38	—	38	2	
Peritonitis	—	16	7	16	—	
Ascites	—	22	4	22	2	
Other Diseases ...	2	234	3	236	—	
Diseases of the Lymphatic System :—						
Splenitis	—	154	1	154	—	
Inflammation of Lymphatic Gland	1	390	1	391	4	
Suppuration of Lymphatic Gland ...	—	40	—	40	—	
Lymphangitis ...	—	11	—	11	—	
Elephantiasis ...	—	18	—	18	2	
Other Diseases ...	—	2	—	2	—	

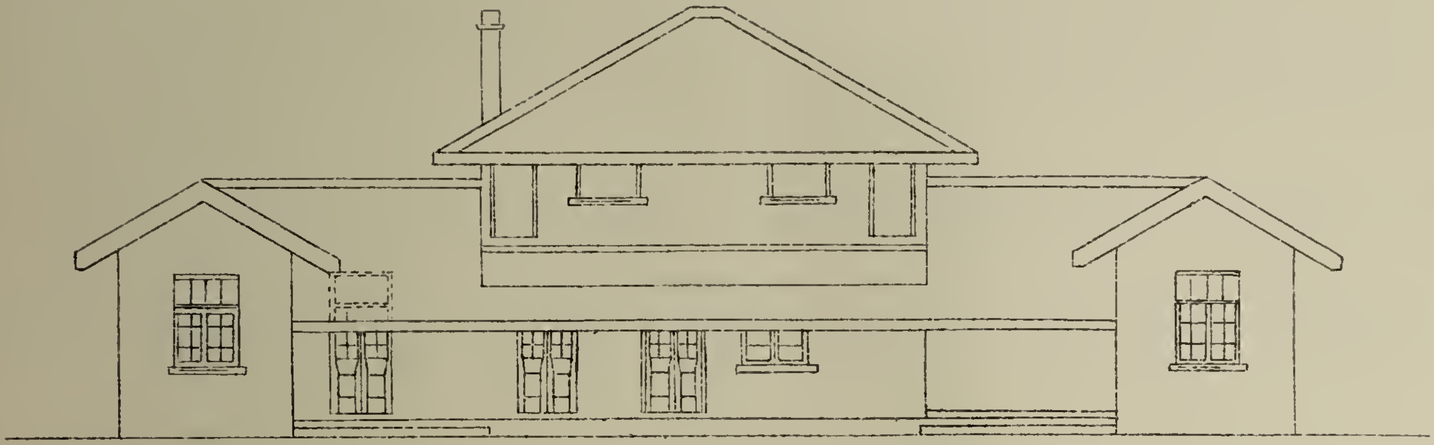
Disease.	Remaining in Hospital at end of 1916.	Yearly Total.		Total Cases treated.	Remaining in Hospital at end of 1917.	Remarks.
		New Cases.	Deaths.			
LOCAL DISEASES—*contd.*						
Diseases of the Urinary System :—						
Acute Nephritis ...	—	45	8	45	1	
Bright's Disease ...	—	34	2	34	—	
Calculus	—	2	—	2	—	
Renal Colic ...	—	3	—	3	—	
Cystitis	—	95	3	95	—	
Hæmaturia... ...	—	28	—	28	—	
Chyluria	—	2	1	2	—	
Other Diseases ...	—	28	—	28	1	
Diseases of the Generative System :—						
(Male Organs) :						
Urethritis	—	44	—	44	—	
Gleet	—	33	—	33	—	
Stricture	—	119	1	119	—	
Prostatitis	—	9	—	9	—	
Soft Chancre ...	3	331	—	334	3	
Condyloma... ...	—	2	—	2	—	
Inflammation of Scrotum	—	5	—	5	—	
Hydrocele	—	67	—	67	—	
Orchitis	1	145	1	146	—	
Epididymitis ...	1	41	—	42	—	
Abscess of Testicle	—	1	—	1	—	
Other Diseases ...	—	183	—	183	4	
(Female Organs) :						
Ovaritis	—	7	—	7	—	
Ovarian Cyst ...	—	7	1	7	—	
Endometritis ...	—	86	—	86	—	
Displacement of Uterus	1	69	—	70	1	
Vaginitis	—	24	—	24	—	
Amenorrhœa ...	—	62	—	62	1	
Dysmenorrhœa ...	—	93	—	93	—	
Menorrhagia ...	—	20	—	20	—	
Leucorrhœa ...	—	22	—	22	—	
Abortion	1	18	—	19	—	
Delayed Labour ...	1	8	1	9	—	
Postpartum Hæmorrhage	—	3	2	3	—	
Retained Placenta...	—	3	—	3	—	
Premature Birth ...	—	5	—	5	—	
Puerperal Septicæmia	—	4	3	4	—	
Mastitis	—	40	—	40	—	
Abscess of Breast ...	—	7	—	7	—	
Other Diseases ...	1	101	1	102	1	
Diseases of Organs of Locomotion :—						
Osteitis	—	103	—	103	—	
Arthritis	2	246	—	248	1	
Spondylitis... ...	—	2	—	2	—	
Bursitis	—	27	—	27	—	
Other Diseases ...	—	1,123	2	1,123	3	
Diseases of Connective Tissue :—						
Cellulitis	3	488	3	491	2	
Abscess	2	844	1	846	1	
Elephantiasis ...	—	18	—	18	—	
Other Diseases ...	—	98	—	98	1	

Disease.	Remaining in Hospital at end of 1916.	Yearly Total.		Total Cases treated.	Remaining in Hospital at end of 1917.	Remarks.
		New Cases.	Deaths.			
LOCAL DISEASES—*contd.*						
Diseases of the Skin :—						
Epithelioma ...	1	—	—	1	—	
Urticaria	—	72	—	72	—	
Eczema	—	472	—	472	—	
Boil...	—	484	—	484	—	
Carbuncle	—	13	—	13	—	
Herpes	—	34	—	34	—	
Psoriasis	—	45	—	45	—	
Oriental Sore ...	—	4	—	4	—	
Tinea	1	582	—	583	—	
Scabies	—	366	—	366	—	
Acne	—	55	—	55	—	
Prickly Heat ...	—	296	—	296	—	
Ulcers	20	5,851	9	5,871	55	
Other Diseases ...	—	703	2	703	2	
Injuries :—						
General	3	124	11	127	—	
Local	23	5,895	22	5,918	60	
Surgical Operations ...						
Major	—	461	—	461	—	
Minor	—	363	—	363	5	
Tumours...	—	149	5	149	1	
Malformations	—	34	—	34	—	
Poisons	—	37	—	37	—	
Parasites—Animal :—						
Protozoa	—	—	—	—	—	
Trematoda (Flukes)	—	2	—	2	—	
Bilharziasis ...	—	35	—	35	—	
Cestoda :—						
Tænia Solium ...	—	502	—	502	—	
Tænia Saginata ...	—	29	—	29	—	
Nematoda :—						
Ascaris	—	371	1	371	—	
Tricocephalus Dispar	—	1	—	1	—	
Dracunculus ...	4	897	—	901	4	
Filariasis	—	33	—	33	—	
Ankylostomiasis ...	—	109	5	109	1	
Oxyuris	—	7	—	7	—	
Other Diseases ...	—	14	—	14	—	
Insecta :—						
Myiasis	—	—	—	—	—	
Chiggars	—	49	—	49	1	
Other Diseases ...	—	141	—	141	1	
Not Diagnosed	—	10	—	10	—	
TOTAL ...	125	52,229	281	52,510	222	

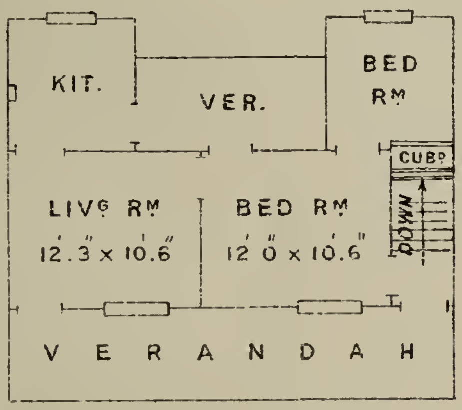
APPENDIX A.

OPERATING ROOM, DISPENSARY & DISPENSER'S QRS.

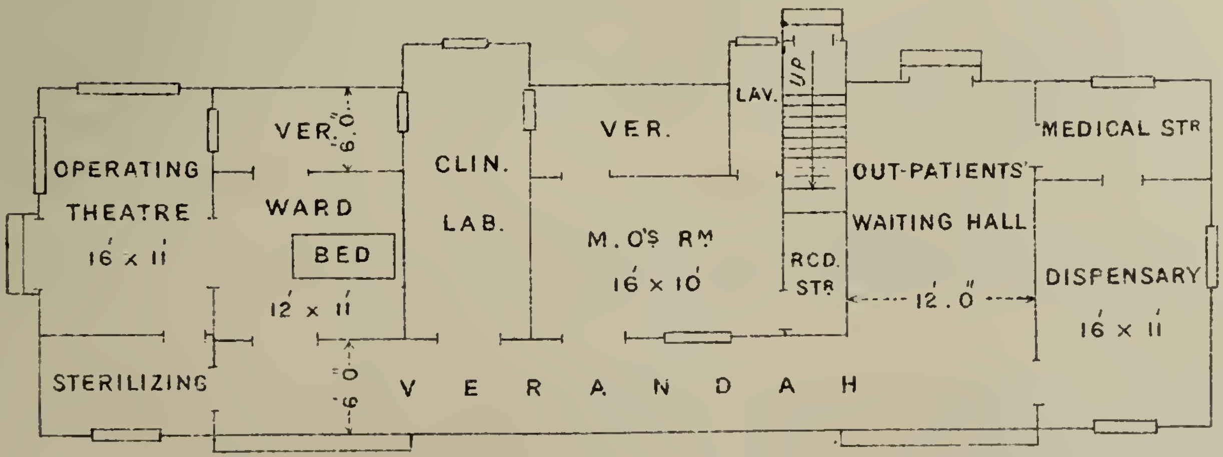
SCALE, 1/16" = 1'.



FRONT ELEVATION



FIRST FLOOR PLAN



GROUND FLOOR PLAN

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APPENDIX B.

INTRODUCTION.

The Pathologist was absent from the Colony during the whole of the year, being seconded for special work at Liverpool in connection with the Malaria Commission of the War Office. To this fact the lack of any record of research work is mainly to be attributed; in a lesser degree, however, it is due to the outbreak of plague at Accra, to shortage of the Medical Staff owing to the exigencies of the war, which has prevented the acting pathologist from devoting the whole of his time to laboratory work and to the loss at sea through enemy action of notes made upon work done during the first half of the year and of specimens collected during that period.

Dr. Ryan worked in the Laboratory for a few weeks during January and February and Dr. Brohier rendered invaluable help during the outbreak of plague.

Dr. Corson was in charge of the Laboratory from the 9th June to the 6th November. He has very kindly supplied the records of examinations made while he was in charge, so that the Report covers the work done during the whole year.

I.—BLOOD EXAMINATIONS.

As usual blood examinations formed the bulk of the routine work. In all 686 examinations were made, 522 blood films were examined for malarial parasites, 105 differential leucocytes counts, 38 Arneth counts were done, two Widal reactions, two Wassermann's tests, and two blood cultures were carried out; seven examinations for microfilariæ, six for trypanosomes and two for *b. pestis* were made; 465 of these examinations were in cases of Europeans and 221 in cases of natives.

Table I.—Examinations for Evidence of Malarial Infection.

Host.	*P. falciparum.*	*P. malariæ.*	*P. vivax.*	Large Mononuclears over 15 per cent.	Pigmented Leucocytes.
Europeans	66	1	1	9	3
Natives	31	6	2	4	2
Totals	97	7	3	13	5

Malaria.—Malarial parasites were found in 68 cases from Europeans and in 39 from natives. In the Europeans *p. falciparum* was found alone in 66 cases, in one case it occurred in conjunction with *p. vivax* and in one case with *p. malariæ*. In the natives *p. falciparum* occurred 31 times, *p. malariæ* six times and *p. vivax* twice; there was no case of mixed infection. Further, as suggestive of malarial infection in the absence of parasites, a large mononuclear leucocyte count exceeding 15 per cent. occurred in nine of the Europeans and in four of the native cases. In addition pigmented leucocytes were seen in three cases in Europeans and in two cases in natives.

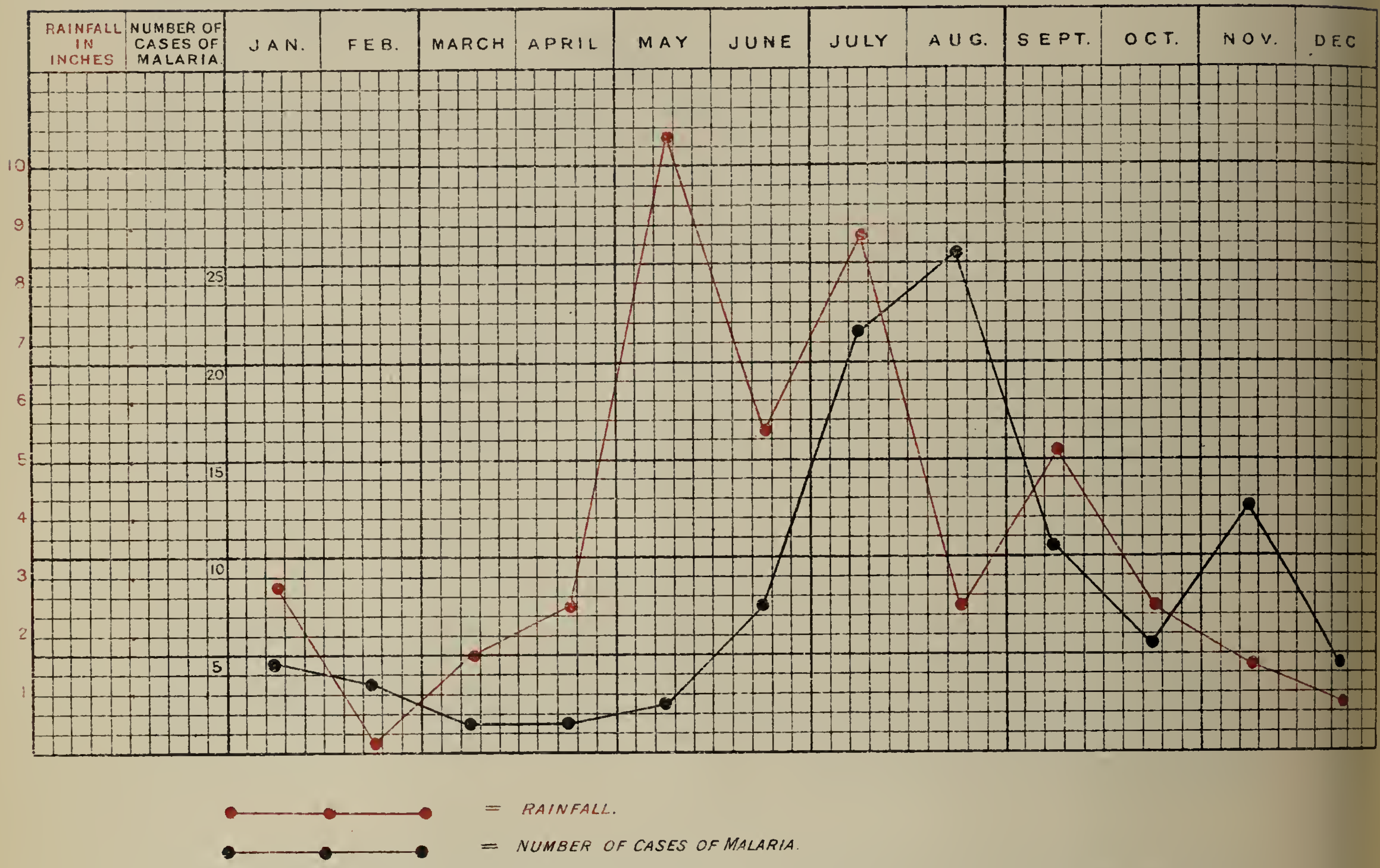
Parasites resembling *p. tenue* were met with in several of the films.

Anaplasmata and parasites with very faintly staining cytoplasm were also found, these appeared to be more common in films from Europeans than in films from natives. Crescents were seen in one European and in three native cases.

The monthly incidence of cases of malaria in relation to the rainfall throughout the year is shown in the accompanying chart. The secondary rise in the malarial curve in November is probably due to relapses and not to fresh infection as six of the 12 cases occurring in that month had shown parasites in their blood during the three months immediately preceding.

It will be seen how closely the malarial curve follows the curve of the rainfall of "Annals of Tropical Medicine and Parasitology," Vol. XI., No. 1, p. 7.

RAINFALL AND INCIDENCE OF CASES OF MALARIA AT ACCRA IN 1917.



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DIFFERENTIAL LEUCOCYTE COUNTS.

In three of the differential counts the large mononuclears exceeded 25 per cent., two of these occurred in cases showing a fairly heavy infection with *p. falciparum*, the third was in a case diagnosed as yellow fever.

ARNETH COUNTS.

The few Arneth counts done confirm the conclusion of the Pathologist that there is a decided "shift to the left" in malarial infections.

One of the Widal reactions was positive, both Wassermann's tests were negative. No growth took place in the blood cultures.

Trypanosomes were found in a blood film obtained from an inmate of the gaol, and microfilariæ (*m. perstans*) were found in one blood film from a native in the asylum.

TABLE II.—INFECTIONS IDENTIFIED DURING THE EXAMINATIONS OF FAECES.

Infection identified.	Europeans.	Natives.	Totals.
E. histolytica	12	40	52
Trichomonas intestinalis	—	20	20
Giardia	—	7	7
Tetramitus mesnili	—	2	2
Unidentified flagellate (Prowazekia ?)	—	2	2
Blastocystis enterocola	3	18	21
Spirochætes	2	20	22
Strongyloides stercoralis	—	6	6
Ova of *ascaris lumbricoides*	—	25	25
Ova of "hook" worms	—	21	21
Ova of *trichiuris trichiura*	1	10	11
Ova of *tænia saginata*	—	2	2

II.—EXAMINATION OF FAECES.

One hundred and eighty-nine specimens of faeces were examined during the year, namely 60 from Europeans 129 from natives.

E. histolytica was found in twelve of the European cases, *blastocystis enterocola* in three, spirochætes in two and ova of *trichiuris trichiura* in a single case.

Of the 129 specimens in natives *e. histolytica* was found in 40, ova of *ascaris lumbricoides* in 25, ova of "hook" worms in 21, ova of *Trichiuris trichiura* in ten and ova of *tænia saginata* in two.

Strongyloides stercoralis was seen in six cases, *trichomonas* in 20, *giardia* in seven, and *tetramitus mesnili* in two. Spirochætes were found on 20 occasions and unidentified flagellate (Prowazekia ?) in two. *Blastocystis enterocola* was observed in 18 specimens examined.

III.—EXAMINATION OF URINE.

The urine was examined in 83 cases, 33 of these were Europeans and 50 natives. In 21 specimens a chemical, in 31 a microscopical and in eight a spectroscopical examination was made. Four cases of hæmoglobinuria in Europeans, one in adult native (Syrian) and one in a native child were examined.

Spirochætes were found in one specimen of alkaline urine from a native, this specimen also contained red blood corpuscles, numerous bacilli, amorphous and triple phosphates. As it was possible that the spirochætes were an accidental contamination a catheter specimen was asked for, but was unobtainable, as the patient only put in one appearance as an out-patient.

Amœbæ were found in the urine of one European and six natives. The European case was that described by Dr. Macfie ("Annals of Tropical Medicine and Parasitology," Vol. X., pp. 295-296), this patient had been entirely free from all symptoms for a period of more than seven months. In the first week of April, 1917, he again began to feel pain in the left groin, and he noticed that his urine deposited a white sediment. A specimen of the urine was kindly sent to the laboratory by Dr. R. O. White, and in the deposit, after centrifuging, consisting for the most part of pus cells, red blood corpuscles and epithelial cells, a few sluggishly motile amœbæ were found. Treatment by injections of emetine was begun immediately and was followed speedily by the subsidence of all symptoms and the disappearance of the amœbæ from urine. No amœbæ could be seen 72 hours after the beginning of treatment, and, although the urine was examined at frequent intervals till the end of May, none was subsequently found.

Of the six native cases, two harboured ova of Bilharzia in addition, in the remaining four the urines were submitted for examination as to the presence of Bilharzia ova or of Gonococci, but amœbæ alone were found.

The symptoms in many of these cases closely simulated those produced by Bilharzia, namely strangury with the passage at frequent intervals of bloodstained urine in small quantities.

Apparently some of these cases respond readily to treatment by subcutaneous injections of emetine. In one case, a soldier at cantonments, ½ gr. of emetine was injected on three successive days, with an amelioration of his symptoms almost at once and the total disappearance from the urine of the amœbæ. This case was kept under observation in hospital for a fortnight, when he had to return to duty ; during this brief period there was no reappearance of the amœbæ in his urine.

Relapses, however, do occur, as proved by the case of the European mentioned above ; it would therefore appear advisable to keep these cases under observation for some time in order to discover if any of them become carriers, as a urinary carrier must be a much more efficient distributor of amœbæ broadcast than an intestinal carrier.

Since Dr. Macfie drew attention to the disease, papers have appeared on the subject by Chalmers and O'Farell ("Journal of Tropical Medicine and Hygiene," Vol. XX., No. 9, pp. 97–99) and by Wright, E. J. ("Journal of Tropical Medicine and Hygiene," Vol. XX., No. 13, pp. 145–146). The disease, especially that form which affects the lower urinary tract, is seemingly far from rare in Accra.

IV.—EXAMINATIONS OF SPUTUM.

Sputum from 80 cases was examined, 11 of these cases were Europeans and 69 natives. Tubercle bacillus was found in three Europeans and in seventeen native cases. Five specimens of sputum from natives were submitted for examination as to the presence of *b. pestis* ; it was absent from all of them.

Spirochætes were found in the sputum of five natives, in four they were associated with *b. fusiformis.*

V.—EXAMINATIONS OF SMEARS OF PUS, ETC.

TABLE III.—EXAMINATIONS OF SMEARS OF PUS.

Materials examined.	Europeans.	Natives.	Totals.
Abscesses, discharge from	—	5	5
Buboes, pus from	—	11	11
Cerebrospinal fluid	1	1	2
Cyst, fluid from	—	1	1
Discharge from ear, nose, tonsil	—	3	3
Empyemata, pus from	—	2	2
Glands, fluid from...	2	3	5
Pleural effusion	—	1	1
Skin vesicle, fluid from	—	1	1
Teeth, pus from	—	3	3
Ulcers, discharge from	8	13	21
Urethral discharge	5	12	17
Uretine discharge	—	1	1
Vaginal discharge...	—	15	15

Under this heading are included 86 specimens obtained from various sources, namely 17 specimens of urethral discharge, 15 specimens of vaginal discharge, 21 specimens of discharge from ulcers, 11 specimens of pus from buboes, five specimens of pus from abscesses, five specimens of fluid aspirated from enlarged glands for examination with regard to trypanosomes, three specimens of pus from teeth and gums, two specimens of pus from empyemata and single specimens of discharge from the uterus, the nose, the tonsil and of fluid from the pleural cavity, a skin vesicle and a cyst.

Gonococci were found in nine of the specimens of urethral discharge, four from Europeans and five from natives, also in four specimens of vaginal discharge from natives, a small spirochæte was present in the discharge from the vagina of a young native of about 12 years of age.

The discharge from penile ulcers was positive as regards *t. pallidum* in two Europeans and in one native. Trypanosomes were found in two of the specimens of gland juice examined ; *p.pestis* was present in the pus drawn from one bubo.

VI.—MISCELLANEOUS EXAMINATIONS.

In 29 different cases during the year an examination of sections of tissues was made, seven of these cases occurred in outstations and the tissues were forwarded to the laboratory to be reported upon, the remainder of the material was derived from operations in the Native Hospital or from the post-mortem rooms in Accra.

One of the cases from the outstations was that of a European who had died of yellow fever, sections of the liver and kidney from this case were stained by the original method of Levaditi, but no spirochætes could be found. An interesting specimen sent for examination was a portion of skin from the diseased area in a case of "Mossy Foot." Cultures were made of scales or of discharge in six cases of skin affections. From three of these, two Europeans (both of whom exhibited a dermatitis of the palm of the hand) and one native, a species of fungus (Nocardia?) was grown—whether this was the same species as that mentioned by Dr. Brohier (Accra Laboratory Report, 1915) it is not possible to state, as no description of the fungus is given in the Report.

Four specimens were examined at the request of the Police, namely, three for blood stains and one for spermatozoa.

Portions of the viscera, namely, brain (one), liver, spleen, lungs and kidney from two cases of hyperpyrexia in Europeans were fixed in Schaudinn's fixative and sections made. There was a history of alcoholism in one case and the liver of this case showed advanced fatty degeneration, all the other organs in both cases showed intense venous congestion, but no malarial parasites could be found. In both cases the temperature was stated to have exceeded 110° Fah. before death.

Cerebrospinal fluid was examined from four cases, namely, one European and three natives. Nothing abnormal was found in the case of the European, pneumococci were found in the fluid of one native case and a diphtheroid bacillus was cultivated from the fluid of another, no organisms were detected in the third case.

VII.—POST-MORTEM EXAMINATIONS.

TABLE IV.

Cause of Death.	Number of cases examined.
Aneurism, aortic	1
Asphyxia	1
Bronchopneumonia	6
Cerebral hæmorrhage	2
Drowning	4
Dysentery, amœbic	4
,, bacillary	1
Enteritis	4
Enteric Fever	1
Fracture of larynx	1
,, ,, pelvis	1
,, ,, skull	3
,, ,, spine	1
Gastro-Enteritis	1
Gunshot injuries	7
Hanging (suicidal)	2
Heart disease	5
Hepatitis	1
Carried forward	46
Brought forward	46
Hepatic abscess	1
Hernia (strangulated inguinal)	1
Hyperpyrexia	3
Leukæmia, lymphatic	1
Malaria	1
Nephritis	4
Pancreatitis, acute	1
Plague	4
Pleurisy (with effusion)	2
Pneumonia, lobar	10
Railway injuries	3
Septicæmia	1
Strangulation	1
Tetanus	1
Tuberculosis, general	1
,, pulmonary	3
Wounds, penetrating	1
TOTAL	85

Eighty-five post-mortem examinations were made, three of these were performed on Europeans and 82 upon natives. The causes of death in the Europeans were hyperpyrexia, 2; chronic nephritis, 1; two of these deaths occurred on board ship whence the bodies were landed for examination.

In the natives death was due to suicide in four instances, in two hanging and in two shooting was the method employed.

Multiple injuries and shock as the result of being run over by railway trains caused death in three cases. Pneumonia was the cause of the largest number of deaths.

Two of the post-mortems appeared to be of sufficient general interest to warrant description.

FRACTURE OF THE LARYNX.

On the 19th April an order was received from the coroner to make a post-mortem examination of the body of O. K., who had died somewhat suddenly that morning. No history of the case was supplied. On arriving at the mortuary the body was seen to be that of a boy about eight years of age. It presented a curious appearance. The whole body seemed to be œdematous from the navel upwards, the eyelids were puffy, the throat was swollen and tense, the hands and arms were swelled and there was a considerable amount of swelling over the front of the chest and the upper part of the abdomen; the lower part of the abdomen and the legs were not affected. There was some œdema over the right parietal eminence and bloodstained frothy mucus was exuding from the nostrils.

On making the usual incision from the suprasternal notch to the pubis a sensation of crackling in the subcutaneous tissues was felt, and on pouring water into the incision small bubbles of air welled up. It was surmised that a fracture of the ribs with injury to the lungs had taken place. On opening the chest the cellular tissue of the mediastinum was glistening and crepitant, both lungs were found retracted, but uninjured, there was no fluid in either pleural cavity and a careful examination revealed no fracture of the ribs. Both ventricles of the heart were contracted, but the organ was perfectly healthy and there was no pericardial effusion.

As the condition of things was puzzling a messenger was sent to try to elicit some history of the case from the friends, he returned with the information that the boy had landed at Accra that morning and that his death was due to a box falling upon his head. During the messenger's absence the abdominal viscera had been examined and found to be congested, but otherwise normal, the scalp had been reflected, the skull opened and the brain removed without finding any gross lesion beyond a bruising of the scalp circular in form with its centre over the right parietal eminence.

The history of the case given by the messenger not having caused much enlightenment as a last resource the trachea, œsophagus, larynx and tongue were removed "en bloc" and examined.

On dividing the larnyx there was visible a dark stained hæmorrhagic patch over the crico-thyroid membrane and the arch of the cricoid cartilage on the right side, the mucosa was torn and the cricoid cartilage appeared to have been fractured on the right side of the arch (this was subsequently proved by dissection to be correct).

This discovery explained the subcutaneous emphysema, but how the fracture had been brought about by the fall of a box upon the head was still a puzzle. It was explained at the inquest, when the father of the child gave his evidence ; he stated that he had landed at Accra with his son on the morning of the accident and was detained some time in the enclosure at the Customs Office. Eventually, having passed the Customs, he engaged carriers to remove his baggage, he was helping to lift the loads to the carriers' heads when one of these loads unfortunately slipped from his hands in the act of lifting it and fell upon his son. He was asked to state the position his son was in at the time of the accident and replied that he could not say definitely, but that a few minutes before he had observed his son with his head partially thrust through a break in the fence enclosing the Customs yard. Apparently the boy's head was still in that position when the box descended, and the fracture of the cricoid was caused by impact with a cross piece supporting the fence. The boy lived for about one and a half hours after the accident.

MALIGNANT MALARIA.

Dr. R. O. White, under whose charge this patient was, has kindly supplied the following clinical notes of the case :—

" J. S., a native of the Kroo Coast, aged 36, male, had been resident in the Gold Coast " for five months. He was said to have been ill for four (?) days prior to his admission to " hospital. Two days before he was admitted he took a dose of a native concoction of oils " extracted from nuts, having purgative properties. An hour after taking this medicine he " was seized with violent attacks of vomiting and diarrhœa, which, according to his friends' " account, were continuous up to time of his being brought to hospital.

" On admission he was in a state of extreme collapse and unconsciousness. Pulse " fluttering, respiration quick, tongue flat and furred all over, skin cold and clammy, " temperature subnormal (96·4 Fah.). He remained in this condition until he died some 48 " hours later. There was no return of the vomiting or diarrhœa. A diagnosis of acute " enteritis was made, and his illness was associated with the taking of the native medicine. " The appearance of the stomach and intestine, when seen at the post-mortem examination, " confirmed this and suggested the action of some strong alkali.

" As his friends were suspicious of poisoning and the patient's symptoms were not " inconsistent with their theory, the case was reported to the coroner, who gave instructions " that a post-mortem examination was to be made."

This examination was made on the morning of 13th May. The body was that of a middle aged and somewhat emaciated native, it was not jaundiced and did not present any external marks of injury and there was no sign of corrosion about the lips, gums, tongue or pharynx. On opening the thorax the heart was found to be normal, but both lungs were extensively bound down by old pleuritic adhesions and were hypostatically congested. The stomach was ligatured at both ends and removed with its contents, the whole of the small intestine appeared of a dark green colour externally, this colour being deepest towards the lower end of the ileum, it was almost empty when opened, containing a little dark tarry material, the mucosa seemed atrophied, the valvulæ conniventes being scarcely visible, it was stained throughout its length a dark grey colour, and in parts, best seen in the lowest seven or eight feet of the ileum, was barred with transverse streaks of black, there were one or two superficial erosions of the size of a split pea dotted irregularly over the surface.

The colon appeared to be very little affected, the lower end of the œsophagus, however, was striped in a manner somewhat similar to that of the small intestine, the dark lines running in a longitudinal direction.

The liver showed venous congestion and appeared fatty, the kidneys were deeply congested, the spleen was congested and pigmented but was not greatly enlarged.

The stomach was opened and its contents, about a litre of dark brown odourless fluid, placed in a bottle and sealed, the mucosa of the stomach presented the same leaden tint as the mucosa of the small intestine, many petechial hæmorrhages and a few as large as a shilling could be seen, the rugæ were prominent, but there were no extensive erosions such as would result from corrosive poisoning. The brain was not examined.

The stomach, with portions of the small intestine, spleen, liver and kidneys were placed in 5 per cent. formalin for further examination.

Smears made from the spleen and lungs showed malarial parasites, but these were not numerous and no *b. pestis* was seen. Sections were cut from the viscera and on microscopical examination pigmented sporulating malarial parasites were found in the liver and spleen and in large numbers in the smaller blood vessels of the submucosæ of the stomach and small intestines.

The parenchymatous cells of the liver and kidney showed after treatment with potassium ferrocyanide and dilute hydrochloric acid large deposits of blue pigment and smaller deposits of yellow pigment.

At the inquest the native herbalist stated that the medicine given to deceased was a preparation of peppers and oils which had been one of his stock remedies for years without hitherto having produced any bad results. The medical evidence was to the effect that the cause of death was probably malaria; but that in the absence of chemical analysis of the gastric contents and the viscera it was not possible to affirm that poison had not been administered. The jury brought in a verdict of death from natural causes.

VIII.—EXAMINATION OF VARIOUS ANIMALS.

1,339 animals were examined during the year, namely, 2 bats, 12 birds, 7 cattle, 7 cats, 8 dogs, 13 goats, 10 horses, 14 mules, 6 sheep, 6 snakes, 1,254 rats. The large number of rats examined was due to the outbreak of plague.

Bats.—Nothing was found in the blood of the two bats examined.

Birds.—The blood of seven doves, two grey hawks, two "hoopoo" (?) birds and a young bird of the stork tribe was examined. Sheathed microfilarias were found in the blood of one dove. *Mallophaga* were taken on the feathers of the stork-like bird.

Cattle.—Blood smears of five dwarf oxen were taken on one visit to the slaughter-house. *t. vivax* was present in one.

Cats.—Ankylostomiasis was present in two of six cats examined and a nematode worm about two inches long was found post-mortem in one case.

Dogs.—"Hook" worms were found in the majority of the dogs examined. *A. ceylanicum* in four and *a. caninum* in one, a tape worm (*Dipylidium sp.* ?) was also common.

One very emaciated dog, covered with sores, besides harbouring *a. ceylanicum* and tape worms had ulcers in the lower part of the small intestines, scrapings from these ulcers showed amœbæ (*e. histolytica ?*).

Goats and Sheep.—No protozoal infection was found in the few goats and sheep examined.

Horses and Mules.—Four horses and four mules showed trypanosomes in the blood. *T. pecaudi* was present in all, and *t. vivax* was also present in one horse and one mule. In the blood of two mules an unidentified organism was seen by Dr. Corson.

Rats.—During the prevalence of plague and for several weeks after its cessation a daily consignment of rats was received from the Sanitary Department for examination. The rats were brought to the laboratory in wooden cases, divided into three compartments, and the following method was adopted in dealing with them:—

Each cage on its arrival was placed in a small sanitary dustbin made of galvanized iron and having a lid, about 20cc. of chloroform was poured on a piece of cotton wool and dropped into the dustbin, the lid was then placed in position and the whole covered with sacking. After an interval of 20 minutes the cage was removed from the dustbin and the dead rats taken from the compartments were sorted into species, placed on a piece of white paper, and brushed for ectoparasites; the compartments were also brushed out and the parasites so obtained collected.

Five different species of rats were brought to the laboratory in the cages.

(1) *Mus. rattus*—this includes the white bellied rat *m. alexandrinus*; (2) *m. decumanus*; (3) *m. musculus*; (4) *cricetomys gambianus*; and (5) a small rat with reddish brown back and flanks and a grey belly, which is commonly seen in the grass country round Accra. In addition to these three specimens of the zebra striped field mouse (*Avicularis zebræ ?*) were examined, this species was never received from the Sanitary Department.

No rat was found infected with *b. pestis*.

Of 1,254 rats examined 666 were *m. rattus* and 40 *m. alexandrinus* (56·29 per cent.), 323 were *m. decumanus* (25·74 per cent.), 185 were *cricetomys gambianus* (14·67 per cent.), 29 were *m. musculus* (2·31 per cent.) and 11 were the brindled wild rat with reddish brown back and flanks (0·87).

Prof. Simpson, in his report on Plague in the Gold Coast in 1908, alludes to the rarity of *m. rattus* in Accra. Graham, W. M., in the report on the Plague Laboratory in Accra included in Prof. Simpson's report, p. 21, states: "No specimen of *m. rattus* was obtained. This rat therefore must be very rare or entirely absent." Again, on p. 25, with regard to *m. decumanus*, Graham remarks: "Relatively few specimens of this rat were received at the laboratory." Connal, however, pp. 27-28 of Prof. Simpson's report, says: "In Accra four species of rats are commonly met with: 1—*m. decumanus*; 2—*m. rattus*; 3—*Cricetomys gambianus* (Waterhouse); 4—A small brown field rat. *M. decumanus* is the most common and *m. rattus* the least common."

It is a little difficult to reconcile these statements with the list of rats given above or with the experience of the Pathologist (Accra Laboratory Report, 1916, p. 27). Two explanations suggest themselves, either that prior to the outbreak of Plague in Accra in 1908 there had been a heavy mortality amongst the house rats, especially in the case of *m. rattus*, or that *m. rattus*, a comparatively unknown species at Accra in 1908, had in the interval increased so enormously as to outnumber the total of *m. decumanus* and *c. gambianus*.

The majority of the specimens of *c. gambianus* examined were infected with a tapeworm *hymenolepis sp.*(?) (Accra Laboratory Report, 1915, p. 80) *hymenolepis diminuta* (Rud), was found in many of the specimens of *m. rattus* and *m. decumanus* and cysts of *c. fasciolaris* (Rud), were common in the livers of these two rats.

A nematode, *physaloptera sp.*, probably the same as that mentioned by Graham (*op. cit.*) as *ascaris sp.* (?) was also found frequently in the intestine and occasionally in the stomachs of both *m. rattus* and *m. decumanus*.

Blood films from three *c. gambianus*, 19 *m. rattus*, ten *m. decumanus* and two brindled wild rats were examined. Nothing was found in the three specimens of *c. gambianus*, one of the wild rats showed "Grahamella" bodies. In five of the specimens of *m. rattus* trypanosomes of the "lewisi" type were seen; in one a trypanosome with a much prolonged posterior extremity (*t. eburneense* ?), Delanoe (Accra Laboratory Report, 1915, p. 72), was found. Three of the ten specimens of *m. decumanus* showed trypanosomes of the "lewisi" type.

Grahamella bodies and basophile dots were seen in the red cells of several *m. rattus* and *m. decumanus*; ring-shaped and oval parasites, with frequently two masses of chromatin, were observed in the blood of one *m. decumanus*. *Nutallia decumani* (?), Macfie (Accra Laboratory Report, 1914, p. 37).

TABLE V.—EXAMINATION OF MOSQUITO LARVÆ, 1917.

	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
Number of samples of larvæ received	42	62	7	38	67	73	48	33	30	9	33	17	459

S. fasciata (F.)	occurred in 355 of the samples ...	77·3 per cent.
C. fatigans (Wied)	,, ,, 105 ,, ,, ,, ...	22·8 ,, ,,
A. costalis (Loew)	,, ,, 5 ,, ,, ,, ...	1·0 ,, ,,
C. decens (Theo)	,, ,, 2 ,, ,, ,, ...	0·4 ,, ,,
C. thalassius (Theo)	,, ,, 2 ,, ,, ,, ...	0·4 ,, ,,
C. tigripes (*Gpre*) *var fusca* (Theo)	,, ,, 2 ,, ,, ,, ...	0·4 ,, ,,
C. tritaeniorhynchus (Giles) ...	,, ,, 1 ,, ,, ,, ...	0·2 ,, ,,

During the year 457 samples of mosquito larvæ were forwarded to the laboratory for examination by the Medical Officers of Health, Dr. J. B. Alexander and Dr. M. B. Hay, to whom we have to express our indebtedness for unfailing interest in this direction.

Stegomyia fasciata, F., occurred in 355 of the samples (77·3 per cent.); *culex fatigans*, Wied, in 105 (22·8 per cent.); *anopheles costalis*, Loew, in 5 (1·9 per cent.); *culex decens*, Theo, *culex thalassius*, Theo, and *culex tigripes*, *var fusca*, Theo, were each found in two samples (0·4 per cent.), while *culex tritaeniorhynchus*, Giles, were found in a single sample (0·2 per cent.).

As has been pointed out previously by the Pathologist (Accra Laboratory Report, 1914, p. 18), these samples represent the mosquitoes which breed in the vicinity of houses in water in gutters and drains, and chiefly in water contained in domestic utensils and barrels provided for them by the carelessness of the natives; they do not indicate the only breeding place of these mosquitoes and they by no means represent the actual mosquitoes to the bites of which the inhabitants of Accra are exposed.

Pressure of other duties prevented much time from being devoted to the study of mosquitoes, the most interesting thing to be recorded was the breeding out from larvæ of that somewhat rare mosquito *mucidus scatophagoides*, Theo, of which the larvæ was previously unknown. The larvæ were found during October in Kimbu tank near the girls' school in Accra, and also in small collections of water near the Rest House and at Adabraka village.

The larvæ is specially interesting in that it is predatory in its habits, as might be expected from the powerful amature of the mouth.

So far as we are aware *culex tigripes* is the only African mosquito known to possess a larvæ with cannibalistic tendencies, though it is almost certain that the larvæ of the genus Toxorhynchites are also cannibals.

The larvæ and pupa of *mucidus scatophagoides* are described elsewhere (p. 52).

A single addition to the species of mosquitoes indigenous to Accra was made during the year, namely *oclerotatus hirsutus*, Theo, the larvæ of this mosquito were found in water in a discarded kerosene tin in the neighbourhood of the Laboratory. It has previously been recorded from the Gold Coast ("Bull. Ent. Res." Vol. III. p. 20), but the exact locality is not given. The total number of species of mosquitoes now known to occur in Accra is 57. *Banksinella fuscinervis*, Edev, having been omitted from previous lists given in the laboratory reports.

ROUTINE EXAMINATIONS.

I.—*Blood Examinations.*

For malarial parasities	Europeans 346 ...	Natives 176	=522
For trypanosomes	,, 4 ...	,, 3	= 7
For microfilariæ	,, 4 ...	,, 2	= 6
For *B. pestis*	— ...	,, 2	= 2
Differential leucocytes counts ...	Europeans 79 ...	,, 26	=105
Arneth counts	,, 27 ...	,, 11	= 38
Blood cultures	,, 1 ...	,, 1	= 2
Widal reaction	,, 2	—	= 2
Wassermann's test	,, 2	—	= 2
			686

II.—*Examinations of Fæces* ... ... Europeans 60 ... Natives 129=189

III.—*Examinations of Urine.*

Chemical	Europeans 9 ...	Natives 12	= 21
Microscopical	,, 17 ...	,, 14	= 31
Spectroscopical	,, 6 ...	,, 2	= 8
For bilharzia ova	— ...	,, 13	= 13
For amœbæ	European 1 ...	,, 7	= 8
For spirochætes	— ...	,, 1	= 1
For gonococci	— ...	,, 1	= 1
			83

IV.—*Examinations of Sputum* ... Europeans 11 ... Natives 69= 80

V.—*Examinations of Smears of Pus, etc.*

Urethral discharge	Europeans 7 ...	Natives 10	= 17
Vaginal discharge	— ...	,, 15	= 15
Discharge from ulcers	Europeans 10 ...	,, 11	— 21
Pus from buboes	— ...	,, 11	= 11
Fluid from enlarged glands ...	Europeans 2 ...	,, 3	= 5
Pus from abscesses	— ...	,, 5	= 5
Discharge from ear, nose, tonsil	— ...	,, 3	= 3
Dental discharge	— ...	,, 3	= 3
Pus from empyemata	— ...	,, 2	= 2
Fluid from skin vesicle	— ...	,, 1	= 1
Fluid from pleural cavity ...	— ...	,, 1	= 1
Fluid from cerebrospinal canal ...	Europeans 1 ...	,, 1	= 2
Fluid from cyst	— ...	,, 1	= 1
Uterine discharge	— ...	,, 1	= 1
			88

VI.—*Miscellaneous Examinations.*

Sections of tissues	Europeans 5	Natives 24	= 29
Skin diseases examinations of hairs, scales, etc.	,, 3	,, 5	= 8
Cultivation of parasitic fungi, etc.	,, 3	,, 3	= 6
Impression smears from organs for *b. pestis*		,, 33	= 33
Police case exhibits, 4			= 4
Cerebrospinal fluid	European 1	,, 3	= 4
Vomit	,, 1		= 1
			85

VII.—*Post-mortem Examinations.*

Europeans 3 ... Natives 82 = 85

VIII.—*Examinations of various Animals.*

Bats	2
Birds	12
Cattle: straight backed (dwarf)	5
Cats	7
Dogs	11
Equines: Horses, 12; Mules, 16	28
Goats	13
Sheep	6
Snakes	9
Rats and Mice	1,254
	1,347

IX.—*Examinations of Mosquito Larvæ.*

Jan., 42; Feb., 62; March, 7; April, 38; May, 67; June, 73 =	289
July, 48; Aug., 33; Sept., 30; Oct., 9; Nov., 33; Dec., 17 =	170
	459

APPENDICES.

By A. Ingram.

I.—MOSSY FOOT.

In the Accra Laboratory Report for 1915, p. 46, Dr. Jupe described a case of "Mossy Leg." In that case, as the patient was unwilling to allow a piece of the diseased skin to be removed, no histological examination was possible; fortunately another case of the disease came under the care of Dr. Jupe, at Secondee, in 1917, and he was good enough to forward to the Laboratory a small portion of the skin excised from the affected area. This disease was first described by Thomas at Manaos ("Annals of Tropical Medicine and Parasitology," Vol. IV., pp. 95-98) but there is no account given in his article of the morbid anatomy. Thomas, however, was able to reproduce the disease in a rabbit by implanting a portion of the tissue beneath the skin of the nose. Castellani and Chalmers ("Tropical Medicine," 2nd edition, p. 1,062) refer to the disease and quote Cranston Low's opinion that the condition may be one of *Tuberculosis cutis verucosa.*

Sections of the piece of tissue received from Dr. Jupe were stained in different ways. No tubercle bacillus was seen in sections stained by the Ziehl-Neelsen method.

The histology of the condition is interesting because it appears to bear a close resemblance to that of *Acanthokeratodermia praecornufaciens* recently so admirably described by Chalmers and Atiyah ("Journal of Tropical Medicine and Hygiene," Vol. XX., Nos. 3 and 4, pp. 25-28, and pp. 36-40).

Under a low power the *stratum corneum* is seen to be greatly thickened and to show wavy "horizontal running areas composed of cupola-shaped masses of cell bounded on each side by inverted cupolas or wedges of cells." No *stratum lucidum* is to be seen but the *stratum granulosum* is well defined, being composed of 4 or 5 layers of cells.

The *rete Malpighii* is hypertrophied and sends down into the corium long processes, many of which unite to form an open network enclosing islands of corium.

Under a high power the corium does not appear to be normal, hæmorrhages appear to have taken place into it, and the connective tissue cells are increased in numbers in some parts, and in others, where the fibrous tissue has a curiously gelatinous look, they appear to be fewer than normal; the blood vessels in the deeper parts are more numerous and the capillaries of the papillæ and of the islands enclosed by the processes descending from the *rete malpighii* are distended.

Sweat glands can be seen in one part of the section, but they are few in number, as the portion of tissue excised is of little depth. Islands of prickle cells are visible well down in the corium at one or two points.

The prickle cells of the *rete malpighii* in the deeper parts of the descending processes are compressed into more or or less parallel lines; more superficially they seem to be further apart than normal and while retaining their fibrils many of the cells show nuclei which are almost entirely vacuoles.

The *stratum granulosum* is prominent, its granules staining intensely, no *stratum lucidum* intervenes between the *stratum granulosum* and the *stratum corneum*, the *rete malpighii* merges into the *stratum granulosum* and the latter into the *stratum corneum*, many of the cells composing the *stratum corneum* appear to be granular, their centres staining more deeply than their margins.

The *stratum corneum* is seen to be irregular in thickness, some portions of the section show the cells adhering closely together to form finger-like processes which alternate with depressions, other portions show only one or two rows of closely adhering cells the outermost layers having broken down and disappeared. In the corneum may be seen one or two enclosures of prickle cells from the *rete malpighii.* Covering the *stratum corneum* proper is a superficial layer which appears to consist of disintegrating red blood corpuscles, fibrin, a few leucocytes and detached portions of the corneum, this layer is best seen where the finger-like processes of the corneum are most prominent and project into it like nails driven into a board. The superficial layer has little coherence and has disappeared from many parts, probably in the process of making the section. At one portion of the section where the *stratum corneum* seems to have been forcibly removed there may be traced through the rete and the corium a connection between the superficial layer and the hæmorrhagic exudations in the corium already mentioned. The hæmorrhages on the surface of the corneum and in the depth of the corium appear to have occurred only a short time before the removal of the portion of tissue, as they show a certain amount of disintegration they are unlikely to have occurred at the time or excision.

If these effusions take place at intervals upon the surface of the growth they may afford a nidus for saprophytic organisms and be responsible for the "mossy" appearance of the part as seen in the living body. The moss-like appearance is absent from parts exposed to friction. Thomas, in his description of his case, states that "the character of the growth alters on the side and heels, instead of appearing moss-like the hypertrophied patches of papillæ form elevated plaques, with a thick and horny or sodden epidermis."

No organisms of any description were visible in the superficial layer lying upon the *stratum corneum* in the sections.

From its histology the disease would appear to belong to the division (c) *Acanthokeratoderdermias* of Chalmers and Atiyah's classification of Primary Non-follicular Hyperkeratoses.

II.—NOCARDIA.

A species of fungus which in cultures showed pleomorphism was grown from epidermic scales in the cases of two Europeans and one native. Both Europeans suffered from a localised and superficial dermatitis of the palms of the hands, the parts affected showing honeycomb-like depressions surrounded by exfoliating scales, the native had a scaly eczematous condition of the scrotum. All the patients complained of intense itching of the affected parts.

Scales obtained by scraping the lesions were first soaked in 70 per cent. alcohol for three hours and then planted on agar and glucose agar slopes. Growth appeared on both media around the scales within 48 hours and spread rapidly till it covered the whole surface.

The fungus grew rapidly under ærobic condition at 37° C., it also grew, but more slowly, at 22° C. Under anærobic condition no growth took place.

In broth, in peptone water and in sugary peptone water media a surface growth which was somewhat tenacious and of a grey colour appeared and extended for a short distance up the sides of the tubes. The media remained free from turbidity, the growth gradually subsiding to the bottom of the tubes.

A moist growth of the colour and consistence of cream was formed on agar and glucose agar ; in older cultures on the latter medium, however, the cream colour changed to a dull purple.

On Sabouraud's medium a similar moist growth to that occurring on glucose agar developed, but assumed a purple tinge at a much earlier stage.

On ascitic agar the growth was drier, of a buff colour and of a crinkled appearance, resembling the surface of morocco leather.

Gelatine (double strength) was liquified, in stab cultures in this medium growth only took place at the surface.

Acid was formed after a fortnight's growth in peptone water with the following sugars :—Glucose, lactose, saccharose, maltose, lævulose, and galactose. Gas was occasionly formed in very small quantities with glucose, lactose, saccharose and maltose, but its formation appeared to be irregular.

Acid was formed with mannite but not with dulcite. Litmus milk was acidified and slight clotting took place. No indol was formed in peptone water and no growth took place in neutral red bile salt glucose peptone water. Potato not being available growth on this medium could not be tested.

Micology.—The growths on agar and glucose agar were not examined usually till the fourth day after the planting of the scales, they then appeared to be composed almost entirely of oval spores about two micra in length, though an occasional bacilli-form body was also visible.

Subcultures made in liquid media showed after 48 hours one or two spores, numerous bacilli-form bodies, and a few longer filaments. After 96 hours the longer filaments appeared to have replaced the bacilli-form bodies, some of which were still present, but the spores had disappeared. The filaments were intertwined to form a mycelium.

The hyphæ were narrow, less than one micron in width, and appeared to be non-septate, but showed irregular branching. For the most part the hyphæ were gram positive, some of them, however, showed beads of gram positive staining material in a gram negative staining sheath.

The bacilli-form bodies and the hyphæ were not acid fast.

At the extremities of a few of the hyphæ a clear bulbous swelling was sometimes seen resembling to some extent the spores seen in smears made from cultures on sold media.

Smears made from the deposit at the bottom of old broth culture tubes showed coccal forms, fragments of hyphæ and a few oval spores. Sub-cultures of this deposit on agar kept at room temperature (25°C) after 96 hours gave rise to a moist, creamy growth which on examination consisted of cocco-bacilli staining evenly.

Upon transferring the culture tube to the incubator (37°C.) these bacilli appeared to develop into the oval spores seen in the original cultures on agar and glucose agar.

A loopful of an agar culture rubbed into the shaven skin of a rat did not inconvenience the animal, but after a week's time small brown papular elevations were noticed on the shaven area :—Scales obtained by scraping the papules were treated with alcohol and then dropped into broth tubes. These tubes were kept at room temperature for a few days, till they showed a surface growth and considerable turbidity of the medium.

Microsopically examined this growth exhibited an acid fast bacillus—possibly a contamination—a non-acid fast cocco-bacillus and a few short non-acid fast filaments. The cocco-bacillus disappeared upon transferring the tubes to the incubator, it appeared to develop into spores.

It is by no means certain that this fungus was the casual agent of the dermatitis in the three cases mentioned above. It is possibly merely a common saprophytic parasite of the skin.

Following Chalmers and Christopherson, "Annals of Tropical Medicine and Parasitology," Vol. X., p. 223, the fungus seemingly belongs to the genus Nocardia, as it possesses no sexual cells and its pores are not situated in asci or basidia, further it has no "accessory fructifications in the form of open or closed receptacles" and its mycelium is formed of fine bacilli-form hyphæ of less than a micron in width, while it grows readily aerobically.

III.—PLAGUE.

In February Plague reappeared in the Colony at Ofako and in March at Temma in the neighbourhood of Accra after an interval of nine years, the last recognised case having occurred in October, 1908.

The origin of the outbreak is obscure, though there is every reason to believe that deaths had taken place from the disease at Ofako for at least a month previous to the actual proof of its occurrence by post-mortem examinations and the recovery of the bacillus from the dead body.

Post-mortem examinations were made at Accra on four cases, which were treaceable to the centre at Ofako, and on two cases at Temma (by Dr. Brohier and Dr. Donnelly), no connection could be established between the cases at Ofako and the cases at Temma.

In the four cases from Ofako, which were regarded as of the septicæmic type, the lungs were congested and showed patches of lobular pneumonia, smears from these organs made at the post-mortems showed only a few *b. pestis*; in marked contrast to these smears made from the lungs of the cases which died at Temma were teeming with bacilli. The Temma cases were considered to be of the pneumonic type. With the exception of the first case from Ofako, in which it was not prominent, there was nothing suggestive of a bubo in any of the cases; in the first case the bubo was situated in the right axilla.

Prof. Simpson, in his "Report on Plague in the Gold Coast in 1908," at page 11, makes the following statement: "A remarkable feature observed in the post-mortem lesions of 12 of the cases in which the stomach and intestines were opened and carefully examined was the hæmorrhagic and congested state of parts of the mucous membrane of the stomach, the patchy hæmorrhagic areas in the small intestine and the congested state of the head of the pancreas where it is connected with the duodenum. Microscopic examination of sections did not disclose in the hæmorrhages, either in the intestines or glands, any plague bacilli, but as the specimen had been preserved in formalin this may account for their non-detection, as in lung tissue, demonstrated when fresh to be full of plague bacilli, no plague bacilli could be detected in those portions also preserved in formalin."

Because of this statement attention was especially directed to the state of the pancreas at the post-mortems and in the bodies examined amongst the Ofako cases it was found to be congested and harder than normal; Dr. Donnelly and Dr. Brohier, who made the post-mortem examinations of the two cases which died at Temma, reported that the head of the pancreas in these cases was greatly congested and the whole organ hyperæmic.

No pathological material was obtained from the Temma cases, but in order to investigate this point portions of the head of the pancreas from two of the Ofako cases were preserved in formalin and in alcohol (90 per cent.); sections were cut from these at a later date. On examining these sections under the microscope the parenchymatous cells appeared to be in a condition of cloudy swelling and their nuclei were degenerate, but no hæmorrhages into the ground substance of the gland could be discovered, and while the larger vessels were engorged, the general appearance of the tissue was much less hyperæmic than the naked eye examination suggested. If the mesenteric glands were primarily involved the congested appearance of the pancreas might be a result of the periglandular hyperæmia. Crowell, B.C. ("Philippine Journal of Science," Vol. X., Sec. B., No. 4, p. 305), who examined 75 bodies dead of Bubonic Plague in Manila, states, with regard to the pancreas: "No recognizable microscope lesion has been seen in the pancreas aside from the occurrence of occasional small hæmorrhages in its capsule and in the interstitial tissue and some congestion of the organ. No remarked morphologic change has been found in the pancreas in any of the cases. In two cases large vessels within the pancreas showed thrombosis, the vessels being filled with leucocytes and a small amount of fibrin with numerous bacilli. No associated change in the surrounding pancreatic tissue was recognizable."

B. pestis occurred in sections made from the tissues whether they were preserved in alcohol or in formalin. In the pancreas baccilli were very scarce, being chiefly found in the blood vessels at their periphery. *B. pestis* was most numerous in the spleen and in the ante-mortem clots taken from the ventricles of the heart.

That preservation in formalin does not destroy *b. pestis* in tissues may be gathered from the article "Notes on Histology of Some of the Lesions Present in Pneumonic Plague," by Wu Lein-Teh and Woodhead in the "Journal of Pathology and Bacteriology," Vol. XIX., pp. 1–32.

Ectoparasites Found on Rats Submitted for Examination.

With a view to identification at home a collection of specimens of each species of rats examined at the Laboratory, together with their ectoparasites, was made, unfortunately, as has been stated previously, this collection was lost at sea. In these circumstances a few words on the parasites collected may not be out of place.

Graham (*op. cit.*) has recorded the finding on *c. gambianus* of *ixodes rasus*, Neum; *rhipicephalus sanguineus*, Latr; *amblyomma variegatum*, F.; *ornithodoros talaje*, G.M.; *xenopsylla cheopis*, Roth; *ctenocephalus fellis*, Bouché; a species of Haematopinus, the larvæ of *c. anthropophaga*, Blanch, and *hemimerus talpoides*, Walk. In addition Macfie has found *x. aequisetosa*, End, and *polyplax calva*, Waterston ("Accra Laboratory Report," 1915, p. 78, and "Parasitology" Vol. IX., p. 199) on this rat. Most if not all of these species were found, and in addition Rhyncota belonging to the families Cimicidæ and Reduviidæ were taken on *c. gambianus*.

Three specimens of a large orthopteron, four or five times the size of *hemimerus talpoides*, Walk, and having the same orange colour, were found on one specimen of this rat. *Rhipicephalus sanguineus*, Latr (?), and *o. talaje*, G.M., were taken on *m. rattus* and *m. decumanus*. *Hæmatopinus sp.* (*polyplax spinulosus* ?) was also found on these three rats and the finding of Cimicidæ and Reduviidæ upon *m. rattus* and *m. decumanus* has also to be recorded.

A small black fly and a small brown beetle (?) were occasionally found in the fur of these three species of rats; like the orthopteron mentioned above these were probably merely commensals.

The flea index was greatest in the case of *c. gambianus*. The largest number of parasites collected from a single specimen was 57, of which 39 were fleas. (This number has been exceeded this year (1918) several times, 150 fleas being captured on one occasion off one specimen of this rat). The flea index of *m. decumanus* was slightly lower than that of *m. rattus*; actual figures cannot be given, as the records were lost. By far the largest number of ectoparasites found on the rats were fleas, and interesting as the finding of bugs may be it is of little importance from an epidemiological point of view, owing to the smallness of their number.

APPENDIX IV.

THE EFFECT OF DRYING ON LARVÆ AND PUPÆ OF *S. FASCIATA*.

Bacot ("Yellow Fever Commission, W.A., Investigators' Reports," Vol. III., p. 79) gives an account of an experiment (No. XXXI.) in which a full grown larva of *s. fasciata* was stranded on wet filter paper and the filter paper allowed to dry for an hour. A small piece of the dry filter paper on which the larva rested was then snipped off and returned to the water. The larva lived for 44 hours, but was unable to get to the surface as it was stuck to he filter paper. Again, two pupæ and two larvæ of this specie, found stranded on mud at the bottom of a cocoanut shell, were removed to wet filter paper and placed in a moist chamber. Within 24 hours adults had emerged from the pupal cases but failed to free themselves from the pupal envelopes. One of the two larvæ lived for three days; the other lived for ten days, and although it was kept moist was unable to move.

Some experiments on similar lines were made with the larvæ and pupæ of *s. fasciata* at the beginning and end of the year, with somewhat similar results as regards the larvæ.

A glass funnel eight inches in diameter supported in an iron ring tripod stand was loosely plugged with absorbent cotton wool and filled to within an inch of its rim with washed sand, upon the sand two thicknesses of filter paper were laid and the funnel was then placed in a sink beneath a tap, which was allowed to drip slowly upon the surface of the filter paper at such a rate as to keep the paper continuously moist but not showing a surface film of water. Larvæ and pupæ were transferred from the jars containing them, together with a small quantity of the water in which they had been living, to the surface of the filter paper and the excess water having drained away they were left stranded on the paper.

It was found that no larva survived for 48 hours, but the majority of the pupæ completed their development, adults hatching from about 80 per cent. of the cases and freeing themselves from the envelopes.

This experiment was repeated several times with almost identical results, 20 full grown larvæ and five pupæ were employed on most occasions. Finding that no larvæ survived these conditions 48 hours the effect upon them of a single wetting for about five minutes every 24 hours was tried, the tap being turned on each morning so as to flood the filter paper to the depth of half an inch. Such a short immersion was found to prolong the lives of a number of the larvæ, though none was alive at the end of 96 hours.

A single experiment is given to show the general result.

Twenty larvæ were stranded on damp filter paper on 26th November at 9.0 a.m.

At 9.0 a.m. on 27th November the surface of the filter paper was flooded, 14 larvæ were alive and capable of swimming.

At 9 a.m. on 28th November the surface of the paper being flooded, 9 larvæ were alive and capable of swimming.

At 9 a.m. on 29th November the surface of the paper being flooded, 3 larvæ were alive and capable of swimming.

At 9 a.m. on 30th November there were no survivors.

Larvæ surviving, on being re-transferred to breeding jars, complete their development, pupate and from the pupæ adults emerge; there is, however, a considerable mortality amongst the survivors after being replaced in the breeding jars, death usually taking place within a short time of the transference.

The death of the larvæ stranded on damp filter paper is not in every case due to its becoming glued to the paper by its anal papillae or by the long hairs on its anal segment, many dead larvæ will float immediately when the filter paper is gently flooded. A larva which has been stranded after transference to the breeding jars will be found to be curiously shrunken, and, as it were, telescoped; if it be capable of movement, it will move at first sluggishly and in a grotesque manner, as though all its joints were stiff, and some time is required before it regains its natural activity. Pupa, on the other hand, scarcely seem to be affected by even 48 hours, drying on the filter paper, they appear to attain their full vigour almost at once upon being placed in water.

If, in place of being kept merely moist, the filter paper be kept distinctly wet—to the extent of showing a surface film of water and of allowing the larvæ to crawl but not to swim over the surface—larvæ will be found to survive at least ten days and on being returned to the breeding jars will pupate and from the pupæ adults will emerge.

(cf., Macfie, "Bull. Ent. Res." Vol. IV., pp. 343–344).

Larvæ of *s. fasciata* placed on filter paper and the filter paper thereafter dried in a breeze in the shade are usually incapable of being resuscitated after three hours. Larvæ of *c. fatigans*, under the same conditions, are not so resistent, being usually killed within two hours, much, however, appears to depend on the rapidity of evaporation.

Spiders and ants were observed to devour many of the stranded larvae at the start of these experiments, the difficulty was got over by placing the legs of the tripod in watch glasses filled with Cyllin and by swaithing the tap in a cloth soaked in that germicide, this procedure was found to prevent the disappearance of many of the larvæ, but not to stop it altogether and the loss of larvæ remained unaccounted for till it was discovered that they were being preyed upon by certain small and active larvæ with black heads.

These small larvæ were kept under observation and adults were bred out. The adults proved to be a species of Ceratopogon (*sens. str.* the wings being hairy, the empodia being nearly as long as the claws and the first tarsal segment of the hind leg being longer than the second tarsal segment in the female).

The larva has 13 segments including the chitinized head, it carries pseudopodia armed with hooks on the first segment behind the head and on the anal segment, these pseudopodia appear to be retractile; on each segment dorsally there is a pair of spines with club-like apices, the head seems to be furnished with three pairs, one pair being longer and probably functioned as antennæ, the pair of spines on the anal segment are also longer than the others; ventrally and laterally on the segments are long and stout hairs, which probably aid the progress of the larva in crawling. The mouth is provided with several hooks and with a pair of comblike structures.

The larvæ when fully grown measure 4 mm. in length, they are active and excellent scavengers, consuming any organic material they may come across. Seemingly they do not like water, although capable of swimming quite well, at all events when the filter paper was flooded they at once made for the sides, crawling up the glass for a short distance above the level of the water and remaining there till the water drained away before venturing again upon tho filter paper to seek what they might devour.

The larval stage appears to last from three to four days, but this is doubtful, as no eggs were found.

The pupa is flattened on its dorsal and ventral aspects, and in shape somewhat resembles a tap root, the anterior extremity is crenellated and the posterior is bifid. The trumpets show a beautifully regular radiated structure at their outer ends. The abdominal segments carry laterally two short stout hairs, but otherwise seem to be without any appendages.

The pupal stage lasts about 36 hours.

Apart from the fact that these small larvæ prey upon stranded larvæ of Stegomyia, their discovery is interesting as but little is known concerning the early stages of African Ceratopogoninæ. It is doubtful whether any Ceratopogon (*sensu stricto*) is a blood sucker. Austen ("Bull. Ent. Res.," Vol. III., p. 107), however, records the finding of the abdomens of *forcipomyia castaneus* and *f. inornatipennis* distended with blood. The females of culicoides, a closely allied group, are voracious blood suckers.

APPENDIX V.

In the Laboratory Report for 1916 a synopsis was given of the Anopheline mosquitoes indigenous to the Gold Coast and it was suggested that the different genera of the Culicines would be taken up in turn. On this occasion the genus stegomyia is dealt with.

The Stegomyiæ belong to the tribe culicini, *i.e.*, they have a thorax more or less rounded, a metanotum without bristles and a scutellum more or less distinctly trilobed. They belong further to the Aedes group of the culicini, as opposed to the culex group, *i.e.*, their eggs are laid singly and not in masses or rafts, the females have the last segment of the abdomen more or less narrow and not truncated and the claws on the fore and middle legs of the female are nearly always toothed and are not simple as in the culex group.

Stegomyiæ are separated from the other genera of the Aedes group (1) by having legs which are not shaggily scaled; (2) by the female palpi, which are less than half the length of the proboscis; (3) by the male palpi, which are apparently three-jointed, with the last two joints thin and equal in length.

They are described usually as black and white mosquitoes, from their predominating colours.

The scales clothing the scutellum and the head, apart from the tuft of upright forked scales in the middle, are flat and imbricated like the slates on a roof.

Nine species of Stegomyia have up to the present been taken in the Gold Coast. These may be identified by the employment of the accompanying table, which is adapted from Edward's Table of Species (" Bull. Ent. Res.," Vol. III., pp. 8-9).

The ungues (claws) of a male mosquito consist of a large and small claw on the fore and middle legs and of two small claws of equal size on the hind legs. The claws on the fore and middle legs are usually toothed, those on the hind legs are usually simple.

TABLE OF GOLD COAST STEGOMYIÆ.

I.—	Hind tarsi entirely dark	I.—*S. argenteoventralis.*
	Hind tarsi with white rings	II.—
II.—	Rings on first four joints of hind tarsi almost equal in length, last joint usually all white	III.—
	Rings on hind tarsi not so arranged	IV.—
III.—	Clypeus scaly, thorax with lyre-shaped white marks ...	2.—*S. fasciata.*
	Clypeus not scaly, thorax with broad line down middle ...	3.—*S. unilineata.*
	Clypeus not scaly, thorax with six white spots	4.—*S. sugens.*
IV.—	White ring on third joint of hind tarsi much broader and more conspicuous than the others, head partly yellow	V.—
	White ring on third joint of hind tarsi not very broad though that on the fourth may be, head not at all yellow	VI.—
V.—	Hind tibiæ with a large white patch at the base beneath, head scales mostly black, leaving a small yellow patch in the centre	5.—*S. africana.*
	Hind tibiæ with a very small yellow patch at the base beneath, head scales mostly yellow	6.—*S. luteocephala.*
VI.—	Fourth joint of hind tarsi mostly or all white	7.—*S. apicoargentea.*
	Fourth joint of hind tarsi mostly or all black, fifth joint mostly or all white, all segments of abdomen with broad white basal bands	VII.—
VII.—	A line of more or less narrow curved white scales on either side of the bare space in front of the scutellum	8.—*S. simpsoni.*
	A patch of broad flat silvery scales in this position ...	9.—*S. metallica.*

The males of the different species of Stegomyiæ found in the Gold Coast may be separated to some extent by their claw formulæ, also mainly taken from Edwards (*op. cit.*, p. 7) which is given below. The larger figures represent the larger claws; the male of *S. argenteoventralis* is not known.

	Fore	Mid	Hind
S. simpsoni	O,o	O,o	o,o
S. africana *S. apicoargentea* *S. metallica*	0,1	0,1	o,o
S. luteocephala	0,1	0,1	1,1
S. fasciata	I,o	O,o	o,o
S. sugens *S. unilineata*	I,1	I,1	o,o
S. argenteoventralis	?	?	?

The following is the distribution of the various species in the three divisions of the Colony taken from the Fly Record Book in the Laboratory:—

Colony proper	*S. fasciata, s. luteocephala, s. metallica, s. simpsoni, s. sugens, s. unilineata.*
Ashanti	*S. africana, s. apicoargentea, s. argenteoventralis, s. fasciata, s. simpsoni, s. sugens.*
Northern Territories ...	*S. apicoargentea, s. fasciata, s. luteocephala, s. sugens.*

APPENDICES.

By J. F. Corson.

I.—UNIDENTIFIED ORGANISM IN MULES.

In two mules an unidentified organism something like a giant trypanosome was present. It appeared to be the same in each case, though in only one was it seen moving in fresh preparations. In the other one it was found in a thick film preparation.

The organism measured 108–110 μ in length by 10 μ in width and was binucleated.

Unfortunately subsequent examinations failed to show the organism.

II.—INTRAMUSCULAR INJECTION OF TARTAR EMETIC IN A MULE SUFFERING FROM TRYPANOSOMIASIS.

A mule belonging to the Sanitary Department was brought to the Laboratory on the 4th September, 1917. The history given was that it was noticed to be dull and unfit for work during the preceding five days.

Trypanosomes of *t. pecaudi* (*t. brucei*) type were present in fair numbers in the blood from the ear.

Two rats inoculated subcutaneously showed numerous trypanosomes within ten days.

Antimony tartrate in 1 per cent. and 2 per cent. solutions, made up with carbolic acid and glycerine, as recommended by Castellani ("B.M.J.," 20th October, 1916) was injected into the shoulder muscles as follows:—

18th September	10cc. of 1 per cent. solution.
21st ,, ...	20cc. of 2 ,, ,,
25th ,, ...	15cc. of 2 ,, ,,
1st October	20cc. of 2 ,, ,,
8th ,, ...	40cc. of 2 ,, ,, (20cc. into each shoulder).

The injections were followed by apparent clearing of the peripheral blood of trypanosomes, which reappeared in small numbers after a few days.

There was no real sign of improvement and on the 13th October the mule became so weak that it was shot.

A post-mortem examination of each shoulder region showed a little yellowish staining of the deep fuscia over the muscle at the points of inoculation and a slight change of colour for about $\frac{1}{32}$ inch into the muscle. No intestinal lesions were found.

The injections appeared to be followed by no swelling or discomfort and on two or three occasions the mule walked three or four miles after injection.

In several cases of rats with experimental trypanosomiasis, injections of tartar emetic were made into the thigh muscles and no case of abscess or necrosis was found post-mortem—merely slight staining of tissues at the site of inoculation.

III.—LARVA AND PUPA OF *MUCIDUS SCATOPHAGOIDES.*—Theo.

The larva is large, measuring from 5 to 6 mm. in length. The head is well chitinized, the antenna is short relative to the head, is slightly curved with the convexity external and possesses a rudimentary hair tuft of two simple hairs, situated at $\frac{5}{6}$th of its length from the base.

The antenna is quite devoid of spicules.

The powerful brushes are a prominent feature of the head, they consist of about 70 strongly chitinized rods on each side, which are curved towards their outer aspect, the concavity of the curve being directed forwards. Each rod is provided with teeth regularly set as in a comb, these teeth are not present on the proxinal third of the rod; beginning as small rounded projections they gradually increase in size, reaching their maximum length at the deepest part of the curvature of the rod and again diminish in size towards the apex of the rod. The mandibles are strongly developed but the head seems to lack facial plumes.

Meinert's underlip is narrow, it has a central tooth, which is the largest, and six to seven teeth on each side of this central tooth, the second tooth on each side proceeding outwards from the central tooth is slightly larger than the first, thereafter the remainder decrease in size towards the outer margin.

The thoracic plumes are formed of hairs which are entirely simple, several of the plumes are fan-shaped and scattered over the thorax are smaller stellate hairs. It is difficult to determine the exact position of these hairs, as the two larval pelts from which the description is made are folded irregularly.

The lateral abdominal hairs appear to be multiple on the first two segments and single on the remaining segments. The siphonal, subsiphonal and anal plumes are all formed of simple hairs notched towards their bases. The comb consists of about 40 scales in a triangular patch. The siphon is rather more than three times as long as its width at the basal ring and the valves are well developed. The pecten is made up of 20–25 teeth, the first three or four of which are rudimentary, it extends to one third the length of the siphon. In the two pelts there is no tuft of hairs visible beyond the termination of the pecten, but sockets are visible so that it is probable that the hairs or hair-tufts have fallen off. The surface of the siphon shows under a high power a shagreen effect, this is also visible and better developed on the anal segment.

The anal segment is rather longer on its dorsal aspect than its ventral and has its posterior border slightly denticulate, the ventral beard is well developed and extends the whole length of the ventral surface, the dorsal hairs are one above and one below on either side and there is a stellate hair on the lateral aspect of the segment towards the ventral border. The anal papillæ are short and the dorsal pair appear to be shorter than the ventral, which is unusual.

Pupa.—The pupa is large.

The paddles are well developed and peculiar in shape, terminating in a blunt angle. The midrib is well formed and there is a distinct external buttress. There are two short hairs, which appear to arise in connection with a curious cup-shaped organ, situated just below the apex of the paddle in which the midrib terminates.

At the posterior angle of the eighth segment is a fan-shaped tuft of about a dozen branched hairs, at the posterior angle of the seventh segment is a tuft of 4–5 simple hairs, immediately internal to this tuft is another formed of 3 or 4 delicate simple hairs.

Single hairs are found at the posterior angles of the 3rd, 4th, 5th and 6th segments.

Towards each side on the dorsal aspect of the 4th, 5th and 6th segments are situate single hairs in pairs, these hairs are very long, extending beyond the distal border of the second segment distal to the one upon which they take origin.

The accompanying table contrasts the larva and pupa of *M. scatophagoides* with the larva and pupa of *culex tigripes.*

Larva.

	Mucidus scatophagoides.	*Culex tigripes.*
Antenna	Slightly curved with a rudimentary hair-tuft.	Not curved and without a hair or hair-tuft.
Brushes	Teeth stouter and shorter.	Teeth longer and more slender.
Meinert's comb	Narrower, central tooth ends in a point; 6 or 7 lateral teeth.	Broader; central tooth is blunt ended; 4 or 5 lateral teeth.
Mandibles	Clawlike tooth in 3 distinct parts.	Clawlike tooth, single.
Lateral abdominal hairs ...	Multiple on 1st and 2nd segments single (?) on remaining segments	Multiple on all segments.
Siphon	Is at least three times as long as its width at basal ring and has no ventral beard and the pecten only extends $\frac{1}{3}$ of the length of the siphon.	Is only $1\frac{1}{2}$ times the length of its width at basal ring, has a beard and pecten extending whole length of ventral surface.
Anal segment	Dorsal surface only slightly longer than ventral; embossing resembles scales.	Dorsal surface considerably longer than ventral, embossing takes the form of teeth or spicules.
Plumes on 8th segment ...	Composed of hairs which are simple or only slightly notched.	Composed of distinctly sub-plumose hairs.

Pupa.

Paddles	Terminate in a distinct projection at end of midrib, which carries a peculiar cuplike organ.	No projection, a slight depression at end of midrib, no cuplike organ distinguishable.
Hairs at posterior angle of 8th segment.	A tuft of hairs a dozen in number and branched.	A tuft of 9–10 hairs which are subplumose.
Hairs at posterior angle of 7th segment.	A tuft of four or five simple hairs.	A tuft of 5–6 subplumose hairs.
Hairs on dorsum of 4th, 5th and 6th segment... ...	Very long single hairs arising in pairs.	Comparatively short double hairs arising in pairs.

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